

OVERCOMING NATIONAL BARRIERS TO INTERNATIONAL WASTE TRADE

*A New Perspective on the Transnational
Movements of Hazardous and Radioactive Wastes*

By
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Στους γονείς μου
Στέλιο και Παναγιώτα Λουκά

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Introduction

Transfrontier movements of hazardous and radioactive wastes, especially to developing countries with inadequate waste infrastructure and lenient environmental laws, have increased significantly during the last decade, and have been the target of strong public opposition in both the developed and the developing worlds. In response to the public outcry, countries have adopted international instruments that restrict or ban waste movements. The Basel Convention¹ requires prior notification and informed consent of the importing country before any waste transfer. It favors recycling, disposal close to the place of waste generation, and state self-sufficiency in waste management. However, by leaving unidentified "sound waste management" and by providing that the proximate facility must also be appropriate, it strikes the door open to divergent interpretations. The Bamako Convention² bans all waste imports into the African region, but allows waste movements between African countries pursuant to the prior notification and informed consent requirement, and a version of proximity and self-sufficiency principles parallel to the one contained in the Basel Convention.

The Basel and Bamako Conventions are the product of an international climate characterized by manifest hostility towards waste movements. This hostility has its origins in the scandalous waste transfers to developing countries that took place in the late 1980s. The restrictions and prohibitions contribute in turn to beliefs that all international waste transfers are ille-

¹ Basel Convention on the Control of Transboundary Waste Movements and Their Disposal, Mar. 22, 1989, reprinted in 28 I.L.M. 649 (1989) [hereinafter Basel Convention]. The Basel Convention has entered into force. At present, twenty-two countries have ratified the Convention. These countries are: Argentina, Australia, China, Czechoslovakia, El Salvador, Finland, France, Hungary, Jordan, Latvia, Liechtenstein, Mexico, Nigeria, Norway, Panama, Romania, Saudi Arabia, Sweden, Switzerland, Syria and Uruguay. It is interesting to note that the United States and European Community countries, except for France, have not ratified the Convention. Yet the United States and the European Community are the major exporters of hazardous wastes.

² Bamako Convention on Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa, adopted in Jan. 29, 1991, 30 I.L.M. 773 (1991). For Annexes, see 31 I.L.M. 163 (1992) [hereinafter Bamako Convention].

gitimate, irrespective of the country and facility of destination. As already emphasized, however, the restrictions and prohibitions in the Conventions are not absolute. The lack of definition of sound waste management, and the qualifications to the principles of proximity and self-sufficiency, render the normative content of the Conventions very indeterminate. The Conventions, in addition, are deprived of implementation and enforcement mechanisms. These shortcomings, however, seem to be veiled by the projected images of these Conventions which stress their prohibitory and regulatory character. In the case of the Basel Convention, proximity seems to be stressed more than suitability even if such prioritization is of no consequence, since the ultimate test is the adequacy of the facility – a very flexible concept that could not preclude the use of a facility far away from the place of generation. The Bamako Convention has also been viewed as an instrument that bans waste transfers into Africa rather than an instrument that falls short of implementation, enforcement, and financial resources to support the ban. The Basel Convention belongs to the category of international legislation labeled in this study *political-pragmatic* legislation, that is legislation that uses politically popular vocabulary to cloak realistic but unpopular goals in order to make them palatable to certain constituencies. The Bamako Convention appertains to the category of legislation called here *political-idealistic* legislation – legislation establishing ambitious goals but no means to materialize them. In this case, the politically popular vocabulary corresponds with the goals, but not the means.

This study makes two claims. The first is that the combination of existing international legal instruments and public opposition has harmed waste management, and has spurred illegal waste transfers to even more unstable and fragile developing countries. I demonstrate that the accumulation of illegal waste transfers is due to misperceptions that prohibitions and restrictions blended with strong public opposition will curb waste movements. Such misperceptions disregard a manifest and fundamental dimension of the waste issue: that wastes are predominantly conceived by their generators as useless substances, and therefore, in the absence of continuous monitoring and expensive enforcement, can be disposed of almost anywhere. I claim that this dimension of wastes, called here *static* dimension, must underlie domestic and international policies regarding waste transfers and management.

My second claim is that the current prohibitory atmosphere has undermined the *dynamic* dimension of wastes – wastes as substances that can be recycled and reused, and can save natural resources. Put in marxist terms, the *static* and *dynamic* dimensions of waste constitute the thesis and antithesis of the waste issue. My argument is that the existing international regime has failed to find the desirable synthesis because it overlooked both the thesis and the antithesis. The existing international regime has embraced, instead, a rather simplistic stance: once waste movements are restricted or banned by difficult to enforce legal instruments, they will somehow disappear, despite increased waste volumes in developed countries and demand for wastes in

less developed countries. The out-of-sight, out-of-mind attitude and incapability to appreciate the complexity of the issue have almost pre-determined the malfunction of the existing system.

This study, by taking cognizance of the *static* and *dynamic* dimensions of waste, attempts to search for an optimal synthesis. Such synthesis has to account for the scarcity of resources. Waste management is neither the most important international problem nor the number one environmental problem. There are other competing and stronger claims for society's limited resources. For this reason, this study will concentrate on the goal of prevention of illegal waste transfers – called prevention of waste mismanagement. This goal is to be attained by the prescription of minimum standards fortified with liability rules. Prevention of waste mismanagement, however, is only an intermediate goal. The final goal is transnational waste management, defined here as waste management stressing efficiency and effectiveness over nationality and proximity. Minimum standards are the external articulation of the *static* dimension of wastes. Transnational waste management is the outward statement of the *dynamic* dimension. Patterns of international waste trade and waste exchanges accomplish the linkage between the *static* and the *dynamic* dimensions, that is the synthesis between minimum standards and transnational waste management. The legal enunciation of the synthesis takes the form of *operative-pragmatic* legislation, legislation that minimizes uncertainty and encourages rather than compels lawful behavior.

Throughout this study the emphasis is on self-enforcement rather than enforcement. This is because enforcement is expensive, and hence countries are reluctant to impose stringent enforcement mechanisms. Self-enforcement is also highlighted because international law is inherently weak on enforcement. International law relies principally on conciliatory and consensual mechanisms. This shortage of conventional forms of enforcement at the international level, in combination with the *static* dimension of wastes and the scarcity of resources, dictate more reliance on self-enforcement. The minimum standards approach proposed, as will be explained in the first Chapter, relies extensively on self-enforcement. The liability rules have also been designed by bearing in mind the deficiency of monitoring and enforcement mechanisms and, therefore, accentuating the severity over the frequency of penalties. Reliance on self-enforcement and prescription of minimum standards, waste trade and exchanges could seem to be radical proposals in the face of prohibitory and restrictive tendencies. However, they are merely pragmatic proposals. Restrictions and prohibitions not supported by monitoring and enforcement mechanisms are ineffective. Yet in a world where famine, civil wars and general economic hardship are prevalent, demands to finance enforcement mechanisms in order to sustain stringent waste management rules are simply unrealistic.

This study consists of eight Chapters: the first Chapter analyzes the thesis of this study and examines in detail the notions of prevention of waste mismanagement, minimum standards, and transnational waste management.

The first Chapter also establishes the premises of an international private liability regime for waste transfers. The second Chapter studies the current international legislation from marine waste disposal to the Organization for Economic Co-operation and Development (OECD) Decision on the international trade in recyclable materials. It also provides an analysis of the existing liability regimes that will be useful for the prescription of an international liability regime for waste transfers. The third Chapter surveys the prevalent waste management methods and practices in developed and developing countries. Chapter 4 contains the available empirical evidence on international waste transfers. Chapters 5 and 6 elucidate respectively the United States and European Community legislation on waste transfers and management. This information is important for two reasons. The United States and the European Community are the major exporters of hazardous and radioactive wastes. Their policies, therefore, as reflected in legislation, are important in indicating future trends in waste transfers. The shortcomings of these policies have also been useful for prescription of the international legislation proposed here. Chapter 7 critically appraises the United States and European legislation and compares the decisions of the United States Supreme Court with kindred decisions of the European Court of Justice. Chapter 8 evaluates the advantages and disadvantages of enforcement and self-enforcement and analyzes in detail the proposed liability regime.

CHAPTER ONE

From Minimum Standards to Transnational Waste Management

1. OUTLINE OF THE CENTRAL THESIS OF THE STUDY

The purpose of this Chapter is to propose an alternative system for cross-border movements of hazardous and radioactive wastes. Before analyzing the proposed system, however, we should first examine the need for such a system.

It could be argued that an alternative system is unnecessary because the current international regime has not been tested sufficiently. The Basel Convention adopted in 1989 was ratified only in 1991, and therefore its negative or positive effects on waste transfers are not easily identifiable. The Bamako Convention is also a recent instrument and its influence on waste transfers is hard to evaluate. In fact, there have been encouraging reports, immediately after the adoption of the Bamako Convention, that it has curbed the waste trade with African countries, and contributed to the increase of waste trade with other less developed countries.¹ One could, consequently, maintain that if all developing regions in the world adopt similar conventions, waste trade with developing countries will be reduced and finally eliminated.

It could be argued also that independent of their effectiveness, bans and restrictions and the underlying proximity and self-sufficiency principles are the only sensible means to waste reduction and waste transfer minimization. According to this argument, other alternative policies short of decisive prohibitions and restrictions will do disservice to waste reduction and will legitimize waste trade. Legitimization of waste trade will contribute to externalization of industry's costs since wastes are usually transferred to countries with less stringent legislation. Legitimization of waste trade will also void wastes of morality considerations. Because, the argument continues, it is immoral to transfer wastes to countries that have nothing to do with their production, and especially to developing countries deprived of waste management infrastructure.

¹ U.S. Waste Scheme Angers Argentina, Chicago Tribune, Nov. 29, 1991, at 24.

My reply to these contentions involves two claims. I claim, first, that it is never too soon to make predictions about the performance of international instruments if there are facts, indices, patterns of behavior, or past experience which demonstrate that such instruments, while they may not fail in the strict legal sense – that is, fail to be ratified – will be ineffective in achieving their aspired goals. In order to prove my claim I will use currently available empirical evidence, the details of which are contained in Chapter 4, and compare the waste trade regime with other similar regimes, such as the ivory trade, drug trade and marine dumping regimes.

My second claim is a more radical one, and it is at the core of the thesis of this study. I claim that the international system needs to revise its goals. The current goals may be appropriate from a management perspective, but they are unsuitable from an international policy perspective. This is the case for two interconnected reasons. Illegal waste disposal is the worst form of waste mismanagement since illegal waste traffickers do not apply any waste management standards. Consequently, the worst externalization of the costs of waste management is not waste transfers to countries with less stringent legislation, but illegal waste transfers. This study also rejects the contention that waste transfers are immoral *per se*. It emphasizes, instead, that it is the conduct of waste transfers that may be considered immoral. Waste transfers conducted efficiently and effectively could contribute to the welfare of both exporting and importing countries, even if those countries are developing countries, and especially to the welfare of future generations.

Based on the above rationale, I propose that:

- (1) minimization of illegal waste transfers, called in this study prevention of waste mismanagement, should replace waste minimization;
- (2) efficiency should prevail over self-sufficiency;
- (3) effectiveness should overrule considerations about proximity;
- (4) transnational waste management should take the place of reduction of waste transfers (Table 1).

The alternative goals just mentioned should not be viewed as disjointed from each other as may perhaps be inferred from the above presentation, the purpose of which is to contrast the alternative policy proposed here with the existing international policy. Prevention of waste mismanagement and transnational waste management embody the notions of efficiency and effectiveness. I intend also to dissipate potential initial impressions that the goal of prevention of waste mismanagement is in conflict with the goal of transnational waste management. I will demonstrate that perpetuation of existing patterns in international waste trade and the spillover of waste exchanges from the area of radioactive to the field of hazardous wastes will connect prevention of waste mismanagement and transnational waste management (Figure 1). In other words, the goals of prevention of waste mismanagement and transnational waste management are intertwined portions of the alternative system that I fully develop in Sections 3–5 of this Chapter. In the next

TABLE 1

Existing system	Proposed system
Waste Minimization	Illegal Waste Transfer Minimization
Self-Sufficiency	Efficiency
Proximity	Effectiveness
Waste Transfer Minimization	Transnational Waste Management

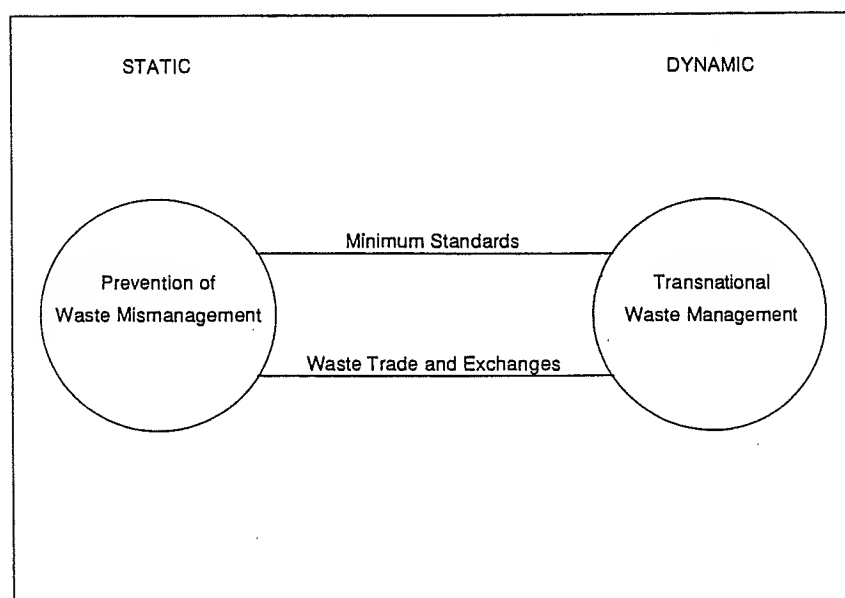


Figure 1.

Section I expand on my first claim that there are strong indices that the existing system is inadequate to cope with the complexity of international waste movements.

2. THE NEED FOR AN ALTERNATIVE REGIME

Because of its nature, it is difficult to determine the extent of illegal waste trade. It has been estimated, however, that international illegal waste trade – waste trade in violation of the emerging international rules² – has been

² Those rules are contained in the Basel Convention. *See* Chapter 2, Section 2.1.

growing at "alarming rates" due to the staggering costs of waste management.³ It has also been predicted that "waste-smuggling will become one of the growth industries of the early 21st century."⁴

It took three years for the Basel Convention to enter into force. Until now the major waste exporters, the United States and most European Community countries, have not ratified it. Only France and Belgium, waste importers rather than exporters, have ratified the Convention. The European Community Regulation⁵ that would ratify the Convention will become effective in 1994, but Germany and Britain have resisted a Danish proposal to amend the Convention in order to ban waste exports to developing countries.⁶ The reluctance of major exporters to ratify the Convention, and impose bans on waste exports demonstrates the difficulties that countries encounter in controlling waste generation and transfers. Countries are additionally unwilling to be held internationally responsible for waste exports that they cannot or do not wish to control. The reluctance of major exporters to ratify the Convention, in combination with the growth of illegal waste trade, are strong indices that the Basel Convention will not be the instrument that will effectively curb waste trade.

The Bamako Convention was not ratified in 1991 as it was hoped. Nigeria has ratified the Basel Convention despite the explicit pledge of the Organization of African Unity (OAU) that African countries should give priority to the ratification of the Bamako Convention.⁷ Initial reports that the Convention has harnessed waste imports into Africa have lost credibility since attempts to illegally export wastes to Somalia, one of the most unstable African countries, were discovered. The failure to swiftly ratify the Bamako Convention, and the continuing waste transfers to even poorer African countries, provide stalwart indication that the Bamako Convention would not effectively control waste trafficking to developing countries.

The inability of prohibitions to control waste trade is corroborated by evidence provided by comparable international regimes in combination with the particular patterns of international waste trade and the idiosyncratic nature of wastes.

Advocates of prohibitions point to the success of the ban on ivory trade. The ban on ivory trade has stopped the killing of the elephant. But this victory, like most victories, has been followed by considerable defeat. The killing of

³ United Nations Environment Programme (UNEP), Environmental Law and Institutions Unit, Environmental Law, in UNEP 21 (UNEP Environmental Law Library No. 1, ed. 1991).

⁴ A Survey of Waste and the Environment, *Economist*, May 29, 1993, at 18 [hereinafter Survey]. See also North's Toxic Exports to the South Continue to Rise, *Inter Press Service*, May 22, 1993 (Lexis, Nexis, Omni File).

⁵ See Chapter 6, Section 2.2.

⁶ Waste Ban on Exports of Hazardous Waste to Developing Countries, *Europe Environment*, Mar. 30, 1993 (Lexis, Nexis, Omni File).

⁷ Resolution on African Common Position on the Basel Convention on the Transboundary Movements of Hazardous Wastes (Jan. 23-30, 1991) (unpublished resolution, available from UNEP).

the elephants has been substituted by the slaughtering of hippopotamus.⁸ Even if such defeat is considered meager since hippopotami are not first class endangered species, it clearly demonstrates that bans do not resolve environmental problems. They merely transpose them to other species, or regions as initially happened with the ban of waste imports into the African region.

Besides, ivory trade does not present the same patterns as waste trade. Ivory supply is strictly dependent on the demand. Switching off demand will plunge prices and render trade unprofitable. The same is not true with wastes. Wastes are not usually subject to any such market forces. Put in market terms, wastes are in huge supply, and the supplier loses instead of profiting in trying to "sell" them. She will, therefore, be much better off if she illegally disposes of them.

This conception of wastes as valueless materials, the *static* dimension of wastes, considerably facilitates their illegal disposal. Ivory traders, in contrast with waste traffickers, have at least incentives to see that their merchandise reaches the targeted destination. Waste traffickers may as well dump the waste in the sea. This *static* dimension of wastes ridicules conventional enforcement and monitoring mechanisms since it essentially requires continuous surveillance of most enterprises.⁹

Even if wastes were considered a sort of commodity, where "demand" would be the willingness of the importing country to receive wastes, squeezing the demand would not necessarily reduce the supply. This is again because of the *static* dimension. A sliding "demand" would not affect supply when wastes can be illegally dumped. Also importing countries, frequently developing ones, do not pay for waste imports. They are, instead, paid for them and often handsomely. It is much easier to convince environmentally conscious elites in developed countries not to consume ivory than to persuade countries stricken by poverty not to import wastes and receive the huge revenues that come with them.

⁸ Meir, *Tracing Illegal Ivory: Forensic Scientists Take on Smugglers*, N.Y. Times, Oct. 29, 1991, at C4, col. 1 (only lately with the development of DNA fingerprinting has the ban on elephant ivory trade become effective. But as one scientist emphasized: "People have simply shifted from killing elephants to killing hippos. The ivory trade hasn't stopped, only the killing of elephants has.").

⁹ See, e.g., *Gulf Patrols Fail to Curb Dumping in the World's Most Polluted Waters*, Agence France Press, Nov. 9, 1992 (Lexis, Nexis, Omni File). An increase in coast guard patrols and threats of prosecution have failed to curb oil dumping by tankers in the Gulf. See also J.K. Hammit and P. Reuter, *Measuring and Deterring Illegal Disposal of Hazardous Wastes* (RAND ed. 1988) [hereinafter *Measuring and Deterring*]. See also United States General Accounting Office (GAO), *Illegal Disposal of Hazardous Waste: Difficult to Deter or Detect* (GAO/RCED-85-2, ed. 1985) [hereinafter *Illegal Disposal*]; M.D. Hinchey, Report to New York State Assembly Environmental Conservation Committee, *Organized Crime's Involvement in the Waste Hauling Industry* (1984); M.D. Hinchey, Report to the New York State Assembly Committee on Environmental Conservation Concerning *Illegal Disposal of Wastes in Hudson Valley, Illegal Dumping in New York State: Who's Enforcing the Law?* (1991).

Recyclable wastes, on the other hand, are viewed as commodities, but unlike ivory, the least environmental advocates would wish to achieve is to discourage their demand. Or one would have hoped so.¹⁰

The policies adopted for waste trade coincide with the policies espoused for the drug trade. In the case of the drug trade, governments have been persuaded that prohibiting drug trade would somehow harness demand. They have thus failed to perceive the deeper social origins of drug use. Demand for drugs has been matched with supplies from poor countries where drug exportation is the most important source of revenue.¹¹ Enforcement mechanisms have also been futilely oriented toward restricting supply that seems to be always present, robust or adulterated, in the face of continuing demand. Prohibiting waste trade will have the same implications. Prohibitions, if accompanied with stringent enforcement mechanisms, will certainly convince certain enterprises to reduce wastes. More important, however, waste bans will generate illegal waste trade because they discount, like drug prohibitions, the origins of the trade that emanate from the *static* dimension of waste. The perception of wastes as valueless materials makes their illegal transfers less complicated than illegal drug transfers. Drug traffickers have to assure that their products reach the desired destination. The intricacies in which they engage to achieve their goal increase the probabilities of their detection. Waste traffickers, on the other hand, do not even have the incentives to see that wastes reach the planned destination. In fact, they will be better off if the wastes transferred are “accidentally lost.” Thus, if it is difficult to control drug trade, one could only imagine the impediments involved in controlling waste trade, especially if it is considered that illegal waste traffickers profit immensely from their activities.

The London Dumping regime¹² underscores the difficulties encountered in controlling illegal dumping. Russia, which had previously purported to comply with the London Dumping Convention, has confessed to dumping high-level radioactive waste in the ocean.¹³ High-level radioactive wastes are the only wastes that the London Dumping Convention has completely excluded from ocean disposal.¹⁴

Both the empirical evidence and past experience demonstrate that prohibitory and restrictive instruments cannot effectively regulate international waste movements. The next sections will analyze the goals and operation of the proposed international regime.

¹⁰ Environmental advocates have condemned OECD’s Decision on the regulation of trade in recyclable materials. See Chapter 2, Section 4.

¹¹ See Bassiouni, Critical Reflections on International and National Control of Drugs, 18 Denver Journal of International Law and Policy 311 (1990).

¹² See Chapter 2, Section 1.1.

¹³ Help for Russia in Nuclear Clear-Up, The Independent, April 12, 1993, at 8 (Lexis, Nexis, Omni File).

¹⁴ For the other black list wastes, there are exceptions. For more details, see Chapter 2, Section 1.1.

3. TRANSITIONAL GOAL: PREVENTION OF WASTE MISMANAGEMENT

The transitional goal of the proposed international policy is prevention of waste mismanagement. Prevention of waste mismanagement means here primarily prevention of illegal waste transfers since illegal waste transfers are the worst form of waste mismanagement, and entail gross externalization of the costs of waste management. Prevention of waste mismanagement in this sense fosters sound waste management. Nonetheless, because it emphasizes prevention of illegal waste disposal, it pays lip service to the aggressive advancement of sound waste management – the pursuit of recycling, reuse, and waste minimization to the exclusion of other waste management methods. As will be analyzed in Chapter 3, there is consensus among waste management specialists that the objectives of sound waste management must be, in order of preference, waste minimization, recycling, waste treatment, incineration and land disposal. The ranking of incineration and land disposal as fourth and fifth options, however, has been used to condemn these methods as environmentally unsound, disregarding that in some cases they may be, scientifically and financially, the only realistic methods available. Reprocessing for radioactive wastes is largely regarded as environmentally unsound because it produces plutonium that is useful for the construction of nuclear weapons.¹⁵ Certain countries, however, engage in reprocessing in order to reduce their amounts of high-level radioactive wastes, and hope to utilize reprocessed fuel as an alternative fuel for their nuclear power plants.¹⁶

Prevention of waste mismanagement and aggressive advancement of sound waste management cannot be sought with equal vigor as goals of an international policy because pursuing one frequently defeats the other. Efforts to gear waste management toward the application of more expensive treatment methods will induce illegal disposal because of the *static* dimension of wastes. While recycling and waste minimization may benefit from stringent environmental laws¹⁷ such benefits are unsatisfactory if they are coupled with an increase in illegal waste transfers. This study assigns priority to prevention of waste mismanagement because, as mentioned above, illegal waste transfers create the worst externalities. Setting prevention of waste mismanagement as a principal goal also assists in dissipating the confusion between sound waste management objectives – which emphasize recycling and waste minimization – and the reality of waste management – which involves land disposal, reprocessing and incineration. This reality cannot be dismissed if a pragmatic international policy is to be designed. In this respect, prevention of

¹⁵ Chapter 3, Section 1.5.

¹⁶ *Id.*

¹⁷ See Survey, *supra* note 4, at 4. National statistics show that in the richest countries with stringent environmental standards municipal waste volumes are growing more slowly than the economy as a whole. See also Schneider, *Manufacturers Recycling Half of the Chemical Waste*, N.Y. Times, May 26, 1993, at A15, col. 1.

waste mismanagement is a more modest goal than aggressive advancement of sound waste management. Yet it is at the same time more realistic.

Prevention of waste mismanagement is also a more appropriate international goal. Cross-border illicit waste trafficking is an international activity that could be subject to international private liability or state responsibility rules, such as the requirement that states should take back illegally transferred wastes. Aggressive advancement of sound waste management as a goal of an international policy, on the other hand, in order to be meaningful and not merely declaratory, requires another kind of an international order – one that dictates specific developmental and environmental policies, and imposes on countries their implementation. This is because waste production is a domestic activity closely inter-related with development. It would be difficult and politically unacceptable to prescribe private liability or state responsibility for the failure of countries to reduce their domestic waste production or recycle.

The next two sections will explore in detail the desirability of prevention of waste mismanagement from an efficiency and equity point of view.

3.1. A Cost-Benefit Analysis

International waste transfers leading to waste mismanagement will minimize the wealth of exporting countries¹⁸ with an indigenous waste management industry. If illegal transfers are discovered exporting countries – because of diplomatic and other international pressure, and according to the emerging norms of international environmental law – will have to take the wastes back. Exporting countries, however, will rarely recover the money spent for taking back and finally disposing of the wastes from the private companies engaging in illegal trafficking because such companies are frequently “paper companies,” the directors of which disappear after the revelation of dumping. On the other hand, if exporting countries refuse or fail to repatriate the wastes, they risk infuriating importing countries with the result of disruption of diplomatic relations or general aggravation of bilateral relationships on other issues. In addition, waste mismanagement transfers harm indigenous waste management industries wishing to participate in waste transfers, but unable to compete with the prices of companies engaging in mismanagement. Moreover, they harm global waste management markets because they bring into disrepute the whole waste management sector with repercussions on domestic waste management industries.¹⁹

Waste mismanagement transfers seem, at first glance, to be beneficial for exporting countries deprived of an indigenous waste management industry.

¹⁸ We assume that states, when estimating the impact of different activities on their wealth, will take into account the long-term consequences of such activities, such as the fact that haphazard land disposal will necessitate future clean-up, or some other form of restoration.

¹⁹ Exploitative waste transfers, for example, have increased public opposition even against legitimate transfers where there is at least some guarantee that the wastes will not be mismanaged. See Chapter 4, Section 2.2.

The absence of such an industry exerts significant pressure on these countries to condone or overlook waste mismanagement deals with other countries. Certainly, if illegal dumping is uncovered, exporting countries will be under pressure to retrieve the wastes. But in this case they will be more willing to weigh the benefits gained by exporting pollution, and the costs involved in having to take the wastes back which, in turn, depend on the probabilities of being caught. These probabilities are very slim given the absence of international monitoring. It seems, therefore, that any waste exportation is a wealth maximizing transaction from the viewpoint of countries lacking an indigenous waste management industry.

Yet more careful reflection reveals that policies condoning waste mismanagement exports will backlash domestically. Industries that mismanage wastes abroad will have the tendency to mismanage wastes at home as well. In fact, domestic waste mismanagement is even cheaper than exportation because it saves the transportation costs. The only way exporting countries can prevent export mismanagement policies from having domestic repercussions is to enact stringent waste laws prohibiting domestic waste mismanagement strengthened by rigorous implementation and enforcement mechanisms. But while this is an attractive hypothesis, it is not a realistic scenario. Until now, at least, countries with a shortage of waste management facilities have not attempted to implement such domestic enforcement measures.²⁰ Moreover, the *static* dimension of wastes indicates that any enforcement plan – short of constant surveillance of most enterprises – cannot be fully successful. Allowing waste mismanagement transfers, therefore, will have a negative impact on the domestic environment and economy. It will create illegal landfills that are costly to clean up and degrade natural resources. A state that endorses or overlooks mismanagement transfers must not dismiss these costs. If it does, it will find its wealth significantly minimized.

Also waste mismanagement transfers are not a wealth maximizing transaction for importing countries. Importing developing countries must weigh the benefits of waste deals, such as foreign exchange that sometimes exceeds their GNP, and the long-term consequences of such deals – for example, the future clean-up costs or the degradation of natural resources. The degradation of natural resources must weigh heavily on the balance mainly for African countries with scarce water resources, since, in these countries, water contamination by haphazard waste disposal could acquire acute dimensions. Because of the urgent economic needs of African countries, nonetheless, there is always the temptation to stress the short-term benefits, and neglect the long-term costs of waste deals. Developing countries may also cultivate the illusion that a waste mismanagement transaction is a one-shot deal that would provide the foreign exchange they need to boost their economies. Considering the nature and extent of the needs of developing countries, it is more plausible that these deals will induce, instead, dependency on waste

²⁰ Australia, a waste exporter, has been unable to curb domestic illegal waste disposal. In fact, it has been the victim of international illegal waste trafficking. See Chapter 4, Section 2.1.

mismanagement schemes. Waste mismanagement transfers must be subject to a similar analysis, if importing countries are developed countries. The difference is that developed countries will be less enticed to accept waste mismanagement deals as a convenient source of revenue.

Since waste mismanagement transfers are not wealth maximizing transactions for the countries involved, the absence of decisive policies to curtail them is intriguing. As emphasized restrictions and prohibitions have not been successful because of the insufficient resources devoted to their implementation and enforcement. This is not because waste is an insignificant global issue. It is because there are environmental problems perceived as more important, such as ozone depletion or climate change, competing with waste management for the allocation of scarce resources. Developing countries, especially, face simultaneously colossal domestic problems, such as starvation or the AIDS epidemic. A cost-benefit analysis between such problems and waste mismanagement places the latter at the bottom of the list, and justifiably so. For this reason, the success of an international policy for waste transfers will necessarily depend on the best use of the limited available resources.

3.2. Inter-Generational Equity

Prevention of waste mismanagement is also desirable for inter-generational equity purposes. Inter-generational equity is viewed in this study as a concept that concretizes society's permanent concern about the future. Civilization has always been future-oriented because the present is so elusive. Despite philosophical disagreements, the common perception of time indicates a vision of life steadily advancing into the future.²¹ Naturally, therefore, for the majority of people, their future and that of the next generation seem to be ever-present in the decisionmaking process, and the same should be true for the generations to come. Since the present cannot be totally divorced from the future, generations have been incapable of neglecting the needs of subsequent generations. The common concern about the future has been strengthened with perceptions that resources are exhaustible. Evidence of this is provided by the genesis of environmental movement and law at the point it was understood that the production and consumption practices could not sustain a livable future.²²

The concept of inter-generational equity becomes problematic when it is understood literally, in a fashion that ascribes rights to future generations and obligations for present generations. Such efforts have been at such a level of abstraction that they are of little assistance when decisions about

²¹ See G.N. Schlesinger, *Aspects of Time* 23-39 (1980).

²² It has been suggested that the exploitative policies concerning natural resources have not been intentional, but based on misconceptions that resources are limitless. Also exploitative policies have not been uniform. "Large areas of land have been preserved from development." See T. Page, *Conservation and Economic Efficiency* 2 (1977).

the management and preservation of natural resources are made.²³ Besides, assigning rights and obligations eventually identical with the emerging norms of international environmental law²⁴ substantially undermines the argument advocating a separate legal notion of inter-generational equity. Understandably, therefore, the notion of inter-generational fairness has been criticized by those who conceive that rights can be assigned only to concrete individuals, and not to nonexistent collective entities.²⁵

In this study the notion of inter-generational equity functions as a metaphor²⁶ that expresses the generally experienced concern about the future. It is also a reminder that the future may extend far beyond present perceptions and, therefore, strengthens the general willingness to take cognizance of the long-term implications of current plans and decisions. It is a concept that enriches the cost-benefit analysis by stressing the long-term impacts of human activities on the environment. And it counter-balances beliefs that resources are limitless, and that life, as we know it, can be preserved effortlessly forever.

It could be maintained, however, that society's future-orientation is insufficiently substantiated and that the welfare of future generations must be disregarded. Life, according to this claim, is not valuable and those unlucky enough to be born must "enjoy" the present without concern about the future that preferably will not exist.²⁷ This argument is invincible in the sense that it derives from a philosophical viewpoint antithetical to the one endorsed in this study: that life is a constant source of unhappiness, and, consequently, efforts to preserve it are simply senseless.

Prevention of waste mismanagement is in tune with inter-generational equity. In the absence of preventive measures, illegal transfers will be haunting future generations with numerous leaking disposal facilities or "surprise" dumps. Consequently, future generations will incur the costs of degraded

²³ See E.B. Weiss, *In Fairness to Future Generations* 24 (1989). In an insightful study of the notion of inter-generational equity Professor Weiss proposes an inter-generational equity model that requires each generation to "pass the planet on in no worse condition than it received it and to provide equitable access to its resources and benefits." An obvious shortcoming of such a model is that, because of constant development, it is difficult to estimate the condition of the planet at the time we inherit it in order to appreciate whether future generations will receive it in no worse condition than we did. It is difficult also to decipher what exactly a "no worse condition" entails since it is not hostile to further development.

²⁴ See, e.g., *id.* at 59-70.

²⁵ See Norton, *Environmental Ethics and the Rights of Future Generations*, in 4 *Environmental Ethics* 319 (1982); DeGeorge, *The Environment, Rights, and Future Generations*, in *Ethics and Problems of the 21st Century* 93 (1979); D'Amato, *Do We Owe a Duty to Future Generations to Preserve the Global Environment?*, 84 *American Journal of International Law* 190 (1990). For further discussion on the notion of inter-generational equity, see *Obligations to Future Generations* (Sikora and Barry eds. 1978). See also *Responsibilities to Future Generations* (Partridge ed. 1981).

²⁶ For the use of metaphor in legal and other contexts, see L.L. Fuller, *Legal Fictions* (1967).

²⁷ One can make such an argument, if one perceives life as constant pain, suffering and lack of communication. See generally E.B. Bax, *Selected Essays of Schopenhauer* (1926); A. Schopenhauer, *On Human Nature* (1897); S. Beckett, *Oh Les Beaux Jours* (1963).

natural resources and clean-up without fully reaping the benefits of haphazard waste disposal.

Nonetheless, an argument could be made that it is preferable to allocate resources, otherwise dedicated to sound waste management, to more worthwhile projects.²⁸ This will not necessarily inhibit the welfare of future generations if such allocations are at the same time beneficial for them. Therefore, instead of requiring industry to pay for expensive sound waste management, we may impose on it to contribute to a pool for the discovery of a vaccine for a deadly disease. A vaccine or a cure for a deadly disease will not only benefit present generations, but also future generations. Therefore, it is inaccurate to claim that future generations will incur the costs of degraded natural resources without fully enjoying the benefits.

This is an interesting argument in the sense that it underlines the multiple trade-offs constantly made when deciding on the priority to be allotted to different social problems. Our society strives to grapple with numerous and diverse issues, simultaneously, by attaching to each of them different degrees of importance. This is because it is almost impossible to convince people with diverse preferences that a social issue is significant enough to require the abandonment of all other goals. As evidenced by the prevalent environmental policies, one of society's goals is not to bequeath a waste-land to future generations. This is not only because of a strict cost-benefit analysis – a planet ridden with chemical and radioactive substances will be the source of many other deadly diseases, therefore, the benefits gained by the cure of the present disease will be offset by the occurrence of other diseases. It is also because the general complexity and number of issues and preferences do not permit the single-minded pursuit of just one or a limited number of them. Diversity and complexity render choices difficult and trade-offs necessary. Such trade-offs, however, often concern the priority assigned to different issues, and not their total eradication from the social agenda.

4. METHODS

4.1. *Minimum Standards*

4.1.1. *Definition*

In this section I establish the components of the alternative international policy designed to achieve the goal of prevention of waste mismanagement. I argue more specifically that transfrontier waste movements should be allowed as long as certain minimum management standards are satisfied.

²⁸ According to scientists, hazardous and radioactive wastes are not the most important environmental problem. See U.S. Environmental Protection Agency (EPA), *Unfinished Business: A Comparative Assessment of Environmental Problems* (Feb. 1987). See also Low-Level Radiation: A Fact Book (The Society of Nuclear Medicine ed. 1982); Ames, Magaw and Gold, *Ranking Possible Carcinogenic Hazards*, *Science*, Apr. 17, 1987, at 271.

The minimum standards, I propose, are largely technological standards for land disposal.²⁹ Technological standards are preferred because, due to their nature, they facilitate implementation and enforcement. It is simpler for domestic and international institutions to verify the installment of certain technological devices than confirm compliance with performance standards. Technological standards will also concretize and facilitate the inspections of landfill monitors since they will not have to verify compliance with complex concentration standards for various contaminants, but rather maintain installed technological devices and assure the functioning of such devices.

The minimum standards policy differs from the policy prescribed in the Basel Convention, which could be interpreted to be pro-waste trade only for the purposes of recycling or for wastes originating from countries without waste management infrastructure.³⁰ The minimum standards policy departs also from the policy espoused in the Bamako Convention which bans waste imports into the African region.³¹ It is also in sharp conflict with the pre-Basel absence of any international standards. The issue, however, is whether such differences between the proposed approach and existing and previous policies are substantial enough to accomplish what these policies have not accomplished: prevention of waste mismanagement.

A first objection to the minimum standards approach could be that it does not solve the problems of implementation and enforcement. A minimum standards landfill, according to this position, is more expensive to build and operate than a dump. Given the absence of international monitoring and enforcement, waste traffickers will take advantage of the minimum standards policy, and instead of disposing of the wastes in minimum standards landfills, they will simply dump them.

This objection is not without merit. Any restrictions imposed on waste trade will cause some illegal trade. On the other hand, free waste transfers will legitimize even waste mismanagement transfers. The goal of the minimum standards approach is to find a middle ground between these two extremes. By prescribing minimum standards for land disposal, the minimum standards approach aspires to avert law abiding waste generators from engaging in illegal waste trafficking because they are unable to undertake waste transfers for recycling, incineration or treatment. Land disposal is overwhelmingly used in comparison with recycling or other waste management methods, and even with prescription of higher standards it is less expensive.³² Consequently, allowing waste transfers only for recycling or other waste management meth-

²⁹ These standards are: (1) double liners; (2) a leachate collection system; (3) everyday monitoring; (4) post-closure sealing with an impermeable liner; (5) and maintenance of the impermeable liner and of the leachate collection system thirty years after closure. Everyday monitoring means that landfill monitors should supervise the landfill everyday and that they should be able to provide proof of such supervision.

³⁰ For more details on the Basel Convention, *see* Chapter 2, Section 2.1.

³¹ For more details on the Bamako Convention, *see* Chapter 2, Section 2.2.

³² Survey, *supra* note 4, at 6.

ods – especially for wastes that are not recyclable, or for which alternative waste management methods are expensive or commercially unavailable – is equivalent to inviting illegal waste transfers. Allowing waste transfers for land disposal, on the other hand, provides an incentive to abandon unlawfulness and engage in legitimate waste trade. The minimum standards approach, therefore, has more potential to limit the clientele of illegal waste traffickers than a policy licensing waste movements only for sounder management methods.

Another objection to the minimum standards approach stems from a management perspective. According to this position, if all landfills eventually leak, despite the sophistication of their design, there is no real difference between illegal dumps and minimum standards landfills. Therefore, the minimum standards policy is similar to the pre-Basel regime where wastes were transported without any controls. The problem with this objection is that it disregards that minimum standards landfills are essentially supervised landfills. Supervision may prevent leaking in a landfill by reallocation of wastes. Numerous technological standards may also, at least, restrict leakage. Overall, it is preferable to know where landfills are situated than to have them discovered when their degradation is already irremediable. Minimum standards are not equal to no standards.

It could further be argued that minimum standards will not be decisive in curbing waste transfers to the developing world. This is because establishing standards is not as pivotal as implementation and enforcement. Developing countries deprived of adequate financial resources will be less successful than developed countries in monitoring and enforcing the minimum standards. Therefore, industries will still prefer to transfer their wastes to developing countries. In other words, minimum standards will neither minimize waste transfers nor prevent mishaps in transfrontier waste movements.

This is a valid concern since corporations frequently invest in developing countries exactly because of the less stringent labor, tax and environmental laws of these countries. If this is the comparative advantage of less developed countries in other types of investment, it will also be their advantage in waste management. Precisely for this reason, the aspiration of minimum standards is not to reduce waste transfers to the developing world. It is to lessen the damaging effects of such transfers. Minimum standards will provide industry with certainty about the international community's expectations regarding waste management, and, therefore, will deter below-minimum-standards waste transfers. If standards are relatively inexpensive and easy to observe, and only their violation triggers severe penalties,³³ industry will realize that it is in its self-interest to comply even when transferring wastes to developing countries.

In addition to the minimum standards, other appropriate management and transportation standards must be provided. Detailed transportation stan-

³³ See *infra* Section 4.2.

dards have already been established and have been successful.³⁴ The other management standards,³⁵ like the minimum standards, must be clear, specific and non-technology-forcing. Clear and specific standards will avert potential confusion in the waste management industry. The non-technology-forcing character is imperative because, due to their inherent contradictions, technology-forcing standards have proven unsuccessful.³⁶ Furthermore, and according to the rationale of this study, technology-forcing standards will intensify illegal waste trafficking since they force the application of expensive or commercially unavailable technologies, and thus multiply expenses and create uncertainty. It is also obvious that the more unattainable standards for other waste management methods become, the more they will encourage application of land disposal.

The minimum and other waste management standards must incorporate the difficulties of developing countries in applying expensive and sophisticated technology. In the case of incineration, for example, while 99.99 percent Destruction and Removal Efficiency (DRE)³⁷ seems an appropriate standard for developed countries, it may not be the suitable standard for developing countries that encounter significant problems in acquiring and applying state-of-the-art technology. Developing countries rely principally on devices already used in the production process. These devices can achieve over 99 percent DRE, but they cannot always attain 99.99 percent.³⁸

The next question is whether minimum standards are the cheapest preventive means of waste mismanagement given society's limited available resources. For this purpose, the minimum standards approach has to be compared with the other two alternative policies: the maximum standards policy – a policy favoring aggressive advancement of sound waste management, and the no-standards policy. The maximum standards policy can prevent waste mismanagement only if states are willing to commit a substantial amount of resources to implementation and enforcement. Given the present amount of resources that states seem willing to devote, the maximum standards approach is not an efficient policy. The lack of enforcement will render this policy very expensive by creating illegal landfills, degrading national resources and jeop-

³⁴ The international codes for the transportation of dangerous goods apply also to waste transportation. For more details, see Chapter 2, Section 3.

³⁵ For instance, additional standards for land disposal, and standards for incineration, and treatment.

³⁶ See E. Reh binder and R. Stewart, *Integration through Law: Environmental Protection Policy 296* (1985) (in the United States, technology-forcing standards have been unsuccessful because agencies are "ill-equipped to identify the future state of the control technology in a given industry or to persuade reviewing courts that such technology will be workable and affordable." Industries do not also have the incentives to develop or finance technologies that would make possible more demanding legislation).

³⁷ The efficiency of combustion of a particular organic compound is called destruction and removal efficiency. See *The Safe Disposal of Hazardous Wastes, The Special Needs of Developing Countries 657* (A joint study of the World Bank, World Health Organization (WHO) and UNEP, World Bank Technical Paper Number 93, ed. 1989) [hereinafter *Special Needs*].

³⁸ *Id.* at 669, 671.

ardizing relationships among states. The no-standards policy, on the other hand, could be the cheapest policy, if states decide that prevention of waste mismanagement is not a desirable goal. In that case waste movements will be left to existing markets without any national or international intervention. The pitfalls of the market system, however, led to waste mismanagement and impelled the development of international standards. Thus, if prevention of waste mismanagement is established as a goal, a pure market system will not be the cheapest solution for waste transfers.

The minimum standards policy attempts to combine the advantages of both the maximum and no-standards policies without incorporating their disadvantages. Since certain international standards are essential to avert waste mismanagement, the minimum standards approach proposes the endorsement of standards facilitating monitoring and enforcement. Minimum standards are, in fact, self-enforcing in the sense that industries are more eager to abide by familiar disposal methods that are cheaper than incineration, recycling or waste minimization. Minimum standards, because they demand less monitoring and enforcement, also put less strain on the scarce societal resources.

4.1.2. *Form*

A treaty requiring years to be ratified will not be the appropriate legal format for the articulation of minimum and other standards. The international regime envisioned here aspires to function largely on a consensual basis. Its objective is not to coerce industry to comply. It is to attract industry to comply by providing clear, specific, and pragmatic standards. A treaty prescribing state obligations will be in contradiction with the self-enforcing spirit of minimum standards. States may be unwilling to endorse it, and years may elapse before it is eventually ratified. A treaty will also be an inconvenient instrument because cumbersome voting procedures most probably will be needed for its amendment. Minimum and other standards, on the other hand, have to be frequently revised in order to adapt to scientific progress, and progress in the implementation of sound waste management.

For these reasons, it would be preferable if the minimum and other standards were incorporated in a flexible international instrument, such as an international code. The international codes for the transportation of dangerous goods have succeeded in harmonizing domestic and international practices for the transportation of those goods, and have averted many accidents. The intent of these codes is not exclusively accident prevention, but also facilitation of international trade. A code regarding land and other waste management methods must be oriented toward the same objectives – prevention of waste mismanagement and facilitation of international waste trade by harmonizing domestic waste management prescriptions and practices. This harmonization is very important. Without harmonization of domestic standards wastes will be transferred to countries with less stringent legislation or to countries that do not apply sound waste management methods. Lack of harmonization will

frustrate state efforts to impose on industry internalization of the costs of waste production.

In this light, minimum standards may also be viewed as an externalization of waste production costs in a hypothetical situation of a country that wishes to really phase out land disposal or apply more stringent standards than the minimum. This is because industries of that country will be able to export their wastes to countries applying the minimum standards. In this study, however, as emphasized before, minimum standards are not viewed as a form of externalization of the costs of waste management. They are viewed, instead, as standards that prevent the gross externalization of the costs of waste production stemming from illegal disposal. Therefore, they contribute to the internalization of the costs of waste generation – admittedly not to the degree desirable from the viewpoint of aggressive sound waste management, but to the extent necessary from the perspective of prevention of waste mismanagement. Minimum standards constitute, nonetheless, the threshold of harmonization and must be followed by harmonization of additional land disposal and other waste management standards.

The knowledge for preparing an international code inclusive of the minimum and other waste management standards already exists.³⁹ What is needed is a flexible instrument that will reformulate this knowledge in a clear and uniform manner.

4.1.3. Operative-Pragmatic Legislation

One may maintain that the Basel and the Bamako Conventions are in harmony with the proposed minimum standards. Both Conventions' annexes include land disposal as a potential waste management method. In fact, the Basel Convention, which does not clarify environmentally sound management, has prescribed that the instrument defining it should take the form of guidelines.⁴⁰ Guidelines and codes are similar instruments. Even more encouraging is the fact that the first set of guidelines issued by the working group⁴¹ explicitly include land disposal. Both the Basel and the Bamako Conventions (the latter only for waste transfers between African countries) also prescribe that the national or proximate facilities must be appropriate – a very indeterminate qualification that could in practice override the principles of proximity and self-sufficiency. The proximity and self-sufficiency principles are mutually antagonistic since there will certainly be cases where the proximate facility will not be a national one. In those cases, the Conventions seem to provide waste exporters with the latitude to send the wastes to wherever they deem appropriate. Because of the inclusion of land disposal as a possible waste management option, as well as the indeterminacy and contradictions of proximity and self-sufficiency principles, it could be claimed that minimum standards are almost in perfect accord with the current regulatory regime.

³⁹ See Chapter 3, Section 1.

⁴⁰ See Basel Convention, *supra* note 1, Introduction, Art. 4(8).

⁴¹ See *infra* note 131, Chapter 2.

Minimum standards are in harmony with the existing regulatory regime, but not a potential restrictive interpretation of it that could be fabricated under an international climate hostile toward waste transfers. The regulatory portions of the Conventions are open to a gamut of interpretations, but the emphasis on waste reduction and waste transfer minimization, the self-sufficiency principle, and a preference for recycling could be construed in a manner that deters efficient and effective waste movements. The shortcoming of the Basel and of the regulatory part of the Bamako Convention is that they establish ambiguous goals as a result of compromises at the political level, thus creating confusion and uncertainty. They are *political-pragmatic* instruments – that is instruments that formulate pragmatic, but politically undesirable goals, in popular verbiage, or establish ambitious goals in order to mask moderate policies that would never attain them. Another example of political-pragmatic legislation is the United States Resource Conservation and Recovery Act (RCRA)⁴² and the European Community Regulation on transfrontier waste movements.⁴³

Since the Basel and the Bamako Conventions could be – and have been – interpreted within the spirit of the minimum standards approach, the analysis of the minimum standards here aspires to underline their importance in prevention of waste mismanagement. The initial guidelines of the working group, while explicitly authorizing land disposal, have not yet elaborated minimum and other standards for such disposal. This should be a matter of priority in developing the notion of “environmentally sound waste management.”

The minimum standards approach is, however, in conflict with the prohibitory provisions of the Bamako Convention. Prohibitions are incompatible with the *static* dimension of wastes and the goal of prevention of waste mismanagement. The prohibitory part of the Bamako Convention is *political-idealistic*. Political-idealistic instruments set ambitious and politically popular goals straightforwardly, but no concomitant implementation and enforcement mechanisms.

In contrast with the *political-pragmatic* and *political-idealistic* instruments are *operative-pragmatic* instruments that establish goals that become feasible through the implementation of clear, and specific policies. Pragmatic goals are cognizant of the scarcity of resources, political commitment, and prevalent practices of relevant actors. Here prevalent practices involve land disposal, and the level of political commitment indicates governments’ reluctance to aggressively advance sound waste management. The minimum standards approach is a clear and specific policy. It prescribes minimum standards – largely technological standards which are, consequently, easy to monitor and enforce. These standards also are prescribed for an extensively used waste management method and their implementation is comparatively less expensive. The technological and relatively inexpensive nature of minimum

⁴² See Chapter 5, Section 1.

⁴³ Chapter 6, Section 2.2.

standards can induce industry's compliance and increase the effectiveness of prevention of waste mismanagement.

Even if optimal, under the existing circumstances, however, the minimum standards approach is not sufficient. There may be cases where industries, in order to accumulate more profits, will tend to lower the quality of waste management services they provide. The purpose of the liability regime analyzed below is to discourage such tendencies. Minimum standards may also hinder the development of regionally integrated facilities and transnational waste management. These latter concerns will be addressed in Section 6 of this Chapter.

4.2. *Liability*

4.2.1. *Liability as a Supplement to Minimum Standards*

The possibility of deterioration of services at waste management facilities makes the prescription of liability rules critical. Industry must know that failure to implement the minimum and other waste management standards will significantly affect its profitability. It must have clear signals that national and international authorities will be ready to enforce the minimum and other waste management standards by imposing severe penalties. The type of liability proposed in this study is strict and unlimited.

Some may argue that liability will subvert the very purpose of minimum standards. Minimum standards have been proposed because they foster rather than force industry's compliance. The same is true with the other waste management standards, which must not be technology-forcing and must account for the capacity of developing countries to implement them. Therefore, liability would be equivalent to stepping backwards to prohibitions and restrictions. Industries unwilling to be held liable for improprieties during transportation and disposal will prefer to dispose of their wastes illegally.

This is a fair objection based on the central rationale of this study that stringent laws will encourage underground waste trade. Minimum standards and standards for other waste management methods are understood in this study, though, as clear and unambiguous standards that will create certainty about industry's expected behavior. Liability, therefore, will be prescribed only if industries violate the minimum or other specific standards,⁴⁴ and not in every case there is a damage to human health and the environment from waste management.⁴⁵ Knowledge of standards, financial and technical ability

⁴⁴ Countries wishing to apply more stringent than the minimum and the other waste management standards included in the international code may still participate in the liability regime as long as their national standards are clear, specific and non-technology-forcing and can be used as defenses by corporations when brought before courts for allegedly unlawful behavior. It will, certainly, be preferable if countries wishing to adopt more stringent domestic standards initiate international proceedings for the amendment of the code.

⁴⁵ This is a strict liability and not a negligence rule since liability will only be imposed if clear and specific standards are violated. Imposition of liability will not, therefore, depend on notions of "reasonableness," "foreseeability," or "proximate cause." According to the liability

to implement them, and legal assurances that only their violation will trigger liability reduce the chances that liability will induce illegal trafficking.

In addition, it could be argued that it is implausible that the sham companies involved in illegal trafficking will be influenced by any liability rules, since they have no assets, can quickly change locations, and are indifferent about reputation.⁴⁶ However, as emphasized before, the international policy analyzed here does not intend to affect the behavior of illegal waste traffickers. Its purpose, instead, is to facilitate legal waste trade in order to diminish the attraction of inexpensive services offered by enterprises penetrated by criminal elements. Liability is envisioned, therefore, mostly as a mechanism that fosters the compliance of corporations willing to comply when standards are clear and penalties severe. In other words, industries that have a propensity to comply will be more willing to do so, if there are penalties for violations of easily observed standards. This is especially true when compliance is less costly than penalties. Given the low probability of detection of illegal traffickers, violators must have no doubt that, even if discovered once, they will be severely penalized. Severe penalties may also be accompanied by wide publication, by national or international authorities, of the names of companies involved in illegal schemes. This will strengthen their perceptions that the costs of violation exceed those of compliance. The importance of severe penalties, emphasized here, strengthens the argument for unlimited liability. Judges must not be thwarted by liability limits that may be disproportionate to the magnitude of the offense. Minimum standards, therefore, that reduce compliance costs, coupled with strict penalties, each time a violation occurs, must constitute the backbone of a liability regime.

Yet states, at the international level, have been quite unreceptive to the notion of unlimited liability because of fears of the adverse effects of such liability on insurance. Chapters 5 and 6 analyze the United States and European regulations and liability rules and challenge the prevailing notion that unlimited liability is the cause of insurance unavailability. Insurance unavailability for environmental harms is due, instead, to stringent regulation and liability rules as well as an expansive judicial interpretation of such rules and regulations. For this reason, the liability rules prescribed here are only supplemental to minimum standards, and, hence, have slight chances to affect insurance availability.

rule prescribed here also, the burden of proof will be on the defendant. Strict and unlimited liability, however, does not mean absolute liability since the application of minimum and other standards is one of the proposed appropriate defenses. In the case of land disposal, minimum standards will constitute an adequate defense, but defendants could strengthen their case by applying additional standards. For the other defenses, *see* Chapter 8, Section 2.1. Often in practice the notions of strict liability and negligence blend as in the case of the doctrine of *res ipsa loquitur* (the event speaks of the defendant's negligence).

⁴⁶ *See* Chapter 5, Section 6.2.

4.2.2. Liability as a Catharsis and Instrument of Democratic Controls

Prevention of waste mismanagement is not the only reason for prescribing liability rules. Liability is also proposed because it facilitates transnational litigation, and citizen participation in the development of international law. By suing corporate polluters – in the domestic courts of a country entangled in an environmental accident – accident victims create precedents about the types of unacceptable corporate or government behavior. The gradual accumulation of these precedents will eventually constitute a body of law that, in combination with traditional international law, could be instrumental in the resolution of environmental disputes. Strict liability functions also as a catharsis mechanism because, by easing litigation, it empowers victims and dilutes the helplessness they experience when confronted with the unexpected consequences of environmental accidents. This is particularly true when liability is additionally unlimited. In that case, victims of serious accidents will not be frustrated by liability limits that they will frequently perceive as inadequate.

The notion that transnational tort litigation may serve as an instrument of direct democracy and as a sort of catharsis is sustained by human rights litigation. The reason behind the lawsuits of citizens of developing countries against dictators in the courts of the United States has not been financial compensation, but vindication by creating precedents that the atrocities of military dictatorships will not be left unpunished.⁴⁷ Transnational environmental litigation will serve similar purposes in disputes where traditional negotiations and settlements have meager chances to persuade accident victims that justice has prevailed. In Bhopal, for example, victims still feel dissatisfied with the settlement reached between the Indian government and Union Carbide. The social uproar has forced the Indian Supreme Court, which supervised the settlement, to reinstate the criminal charges – that were part of the settlement – against Union Carbide. Social dissatisfaction could have been avoided, if victims were allowed to file a class action in the United States courts. The United States was a forum more favorable to them than India because of the development of the American tort doctrine. If victims were allowed to bring an action in the United States, or otherwise present their case in front of a tribunal, they could have accepted more easily potential defeat, and felt more in control of their destiny.

Viewing international torts as a system of initiation of democratic controls and appeasement of divisions could be criticized as unrealistic, since citizens of most countries are not litigious. This reality, however, is changing rapidly. Environmental groups in developing countries have started bringing suits against corporate and government polluters. The purpose of an international tort system, therefore, will be to enable a domestic litigation to transcend national frontiers.

⁴⁷ See generally Chapter 8, Section 2.2.

Even if strict and unlimited liability can prevent waste mismanagement and instill direct democratic participation in the international system, it is doubtful whether it could promptly and adequately compensate pollution victims. Most existing adjudicatory systems are slow and expensive. Moreover, in some instances, corporate polluters cannot be detected, held liable, or afford the full amount of compensation. Victims of waste mismanagement, on the other hand, may need immediate relief, and it will be unfair to deny them compensation just because a particular polluter cannot provide it or because nobody can be held liable. The development, therefore, of a compensation system that would comprise, on top of private liability, social insurance components is necessary. The social insurance components of such a system may take the form of an international fund that will provide full or residual compensation and immediate relief.⁴⁸ The fund can be modeled after the existing oil pollution funds.⁴⁹ It can be financed by waste exporting and importing states based on the amount of wastes they import and export and their GNP, by private industries or a combination of both. However, the lack of knowledge about the involvement of each industrial sector in waste mismanagement mandates a two-stage development of the fund as prescribed in Chapter 8.

5. FINAL GOAL: TRANSNATIONAL WASTE MANAGEMENT

Transnational waste management, as emphasized elsewhere,⁵⁰ incorporates efficiency, effectiveness and inter-generational equity. Transnational waste management rejects the idea that the “nationality” of wastes, or parochial perspectives of inter-regional fairness should determine waste management options. The next sections will expand on the notion of transnational waste management and its relationship with prevention of waste mismanagement.

5.1. *A Cost-Benefit Analysis*

It is striking that the proximity and self-sufficiency principles so favored for hazardous waste management have played no role in radioactive waste management.⁵¹ The fact that radioactive wastes have been perceived as the concern of governments rather than industries has internationalized radioactive waste management. Given the limited number of treatment and reprocessing facilities, countries have frequently engaged in waste transfers out of necessity.⁵² Moreover, numerous disposal facilities – as has been the case

⁴⁸ Chapter 8, Section 2.3.

⁴⁹ See Chapter 2, Section 5.1.

⁵⁰ See generally E. Louka, *The Transnational Management of Hazardous and Radioactive Wastes* (Yale Law School, Schell Center Series ed. 1992) [hereinafter *Transnational Management*].

⁵¹ See Chapters 3, 5 and 6.

⁵² *Id.*

with hazardous wastes – are not even discussed as a feasible option for radioactive waste management. On the contrary, even if not further explored, the construction of an international repository for high-level nuclear waste disposal has, at least, been proposed.⁵³ Low-level radioactive waste management has favored regional over local facilities,⁵⁴ and many countries have adopted plans for co-disposal of low- and high-level wastes in underground repositories.

Since hazardous wastes are at least as harmful as radioactive wastes, it is remarkable that their management has been guided by totally different policies. The different policy prescriptions could be attributed to beliefs that self-sufficiency in hazardous waste management induces hazardous waste minimization at the source, but cannot cause similar minimization of high-level radioactive wastes. It is equally troublesome to turn off low-level radioactive waste production at least for low-level wastes that are byproducts of medical institutions and laboratories.

Up to this point, I have rejected the argument that self-sufficiency expressed with prohibitions and restrictions induces waste minimization. But even if, for the sake of argument, I assume that self-sufficiency will definitely lead to waste minimization, that does not supply sufficient explanation for devising different policies for hazardous and radioactive wastes. Other wastes such as sewage sludge, all infectious medical wastes, and hazardous wastes for which no source minimization is yet in sight should also qualify for regional or transnational waste management. There are no proposals, however, for the construction of regional facilities for sewage sludge, medical wastes, and hazardous wastes not reducible at the source.

This study proposes that hazardous waste management can benefit from the policy perspectives underlying radioactive waste management. The amount of hazardous waste produced cannot certainly be accommodated in an international repository. Integrated facilities, however, incorporating recycling, treatment, incineration and disposal units, and allowed to receive wastes from wider regions or different states, are a possible and attractive alternative.

From the point of view of efficiency, integrated regional facilities – because they take advantage of the economies of scale – are a cheaper option than numerous smaller facilities.⁵⁵ International organizations have

⁵³ See Chapter 3, Section 1.1.

⁵⁴ See, e.g., Chapter 5, Section 5.

⁵⁵ See, e.g., United States Office of Technology Assessment (OTA), *Partnerships under Pressure: Managing Commercial Low-Level Radioactive Wastes* 13–14 (1989) [hereinafter OTA (1989)]. (“Many of the costs associated with developing a facility are fixed (e.g. State screening operations, site characterization, licensing, monitoring program, compensation packages to host community, and financial incentives). Therefore, costs per unit volume will increase with facilities designed to hold small waste volumes For example, disposal in a below-grade vault for a compact region generating only 10,000 cubic feet of waste a year could be between \$450 and \$590 per cubic foot, while in a compact region generating 230,000 cubic feet of waste a year the cost could be between \$50 and \$56 per cubic foot for the same disposal design.”); Measuring and Deterring, *supra* note 9, at 12. (“Increased in-house management

proposed regional facilities as a desirable option over local or national facilities for developing countries generating small amounts of hazardous wastes.⁵⁶ Regional facilities are also more effective than numerous smaller facilities because they make less use of natural resources,⁵⁷ and advance monitoring and enforcement.⁵⁸

These facilities could be planned and operated by states, consortia of states, industries, joint ventures between industries and states, or with the participation of international organizations. Considering the widespread trend for privatization, however, it is implausible that states will be trusted with the management of these facilities. Yet states and international organizations may play a key role in strategically planning or coordinating them. This is because states and international organizations are particularly experienced in public works projects that demand planning and coordination at the national or international level.⁵⁹ The proposed strategic planning and coordination of transnational facilities must be responsive to current and future waste production, as well as the dynamics of waste trade. As will be demonstrated in Section 6, the prevailing trends in waste markets favor transnational waste management.

5.2. The Inconsequence of the Proximity Principle

Transnational waste management could be criticized for raising the risks of transportation accidents by encouraging the development of regional facilities, not necessarily close to the place of generation. It is only natural for accidents to increase the longer the distance between the place of generation and the place of disposal becomes. The exact safety record of hazardous and radioactive waste transfers, however, is not empirically verifiable since most studies examine the risks of hazardous material transfers in general. Furthermore, the data presented in these studies are incomplete, and the models

[due to stringent regulations] may increase social costs if large generators have a comparative disadvantage in properly treating and disposing of hazardous wastes relative to specialized waste-management firms.”).

⁵⁶ See Chapter 3, Section 3.

⁵⁷ Schmalz, *Geological Factors in Disposal Site Selection*, in *Hazardous and Toxic Wastes: Technology, Management and Health Effects* 124, 131–32 (1984) (ideal hazardous waste sites are “few in number and both difficult and costly to identify. In the light of the urgent national need for disposal facilities, therefore, it is appropriate to consider them as geological resources analogous to ore deposits or oil fields.”).

⁵⁸ See Survey, *supra* note 4, at 7. (“Many of the safety costs, including the costs of monitoring and inspection, do not rise in line with the size of a site [...] they rise in accordance with the number of the sites. The same is true with the costs regarding the issuance of permits”).

⁵⁹ See, e.g., Bharier, *Water Supply and Waste Disposal*, in *Technology, Finance, and Development: An Analysis of the World Bank as a Technological Institution* 107 (Weiss and Jéquier eds. 1984).

used, instead, have been challenged by public-interest groups as inappropriate because they are not inclusive of all real life situations.⁶⁰

Despite the lack of data, there seems at least to exist a consensus that the safety record of radioactive material transportation has been good.⁶¹ In addition, it has been maintained that the railway transportation of hazardous waste will very rarely result in accidents that will adversely affect populations.⁶² The number of hazardous waste accidents due to road transportation to a facility further away from the place of generation is not substantially greater than accidents due to transportation to a small number of facilities closer to the place of generation.⁶³ Studies also reveal that a great deal of accidents

⁶⁰ See United States Nuclear Regulatory Commission (NRC), Office of the Standards and Development, Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes J-77-9 (NUREG-0170, ed. 1977) [hereinafter Final Environmental Statement]. See also NRC, Office of State Programs, State Surveillance of Radioactive Material Transportation 2 (NUREG-1015, ed. 1984). ("As a result of State surveillance, the States reported that the three most common problems in compliance with RAM [radioactive material] transportation regulations appeared to be: 1. inadequate or incorrect package labelling; 2. improper shipping papers; and 3. incorrect and missing placards. Other common problems reported by the States include: improper blocking and bracing of the packages to prevent shifting; improper loading of trucks to minimize exposure to the drivers ...; improperly designed cargo terminals to minimize exposure to handlers; improperly sealed low-level radioactive waste drums; improper placement of containers in vehicle resulting in cracks; failure to comply with exclusive-use vehicle regulations; motor carriers safety, such as mechanical problems with trucks and driver violations of traffic laws; split wooden and steel transporting boxes; and failure to maintain casks in compliance with certificates.").

⁶¹ See Sandia Report, J.D. McClure and A. Tyron-Hopko, Radioactive Material (RAM) Transportation Accident/Incident Analysis (1986); C.E. Cashwell and J.D. McClure, A Historical Summary of Transportation Accidents and Incidents Involving Radioactive Materials (1971-1988) (Sandia National Laboratories, ed. 1989); International Atomic Energy Agency (IAEA), Assessment of the Radiological Impact of the Transport of Radioactive Materials 26 (IAEA, TECDOC-398, ed. 1986). ("Reviews of the available historical data have shown that there has never been a serious incident involving the dispersal of radioactive material The information available suggests that there has never been an accident or incident involving radioactive material transport which has led to the significant exposure of a member of the public."). See also IAEA, Emergency Response and Preparedness for Transport Accidents Involving Radioactive Material 13 (Safety Series No. 87, ed. 1988). See also M. Resnikoff, The Next Nuclear Gamble 22 (1983). ("The alleged 'perfect' record of nuclear transport is also flawed. While no major accidents have occurred, many troublesome small incidents have [emphasis added].").

The radiological effects on populations from normal transportation seem to be small. According to the NRC, "none of [the permissible radiation exposure emitted from packages during transport] would produce short-term fatalities. On a statistical basis, expected values for health effects that may result from this exposure are 1.7 genetic effects per year and 1.2 latent cancer fatalities distributed over the 30 years following each year of transporting radioactive material in the United States at 1975 levels." See Final Environmental Statement, *supra* note 60, at iv.

⁶² E. Ricci and R.B. McLean, Accident Analysis of Railway Transportation of Low-level Radioactive and Hazardous Chemical Wastes (Oak Ridge National Laboratory ed. 1988).

⁶³ Schwartz, McBride and Powell, Models for Aiding Hazardous Waste Facility Siting Decisions, 18 Journal of Environmental Systems 97, at 116 (1988-89). ("The result for the expected number of accidents per year is simply ten times as large: 0.043 for alternative #1 [consists of small number of incinerators close to the sources of waste in urban areas] and 0.150 for

happen during loading and unloading of hazardous and radioactive materials – and not during actual transportation.⁶⁴

These studies, however, have not allayed disagreements on the methods to improve industry's safety record. Proposed methods of improvement involve the means of transport, the speed of transport,⁶⁵ and the use of special itineraries that would avoid large population centers.⁶⁶ The debate regarding the upgrading of transportation infrastructure becomes confrontational when the issue is not the safety enhancing capacity of a particular measure but the cost-effectiveness of such a measure.⁶⁷ Cost-effectiveness issues in radioactive waste transportation, for example, have been especially controversial. In Sweden barge transportation has been considered the safest mode of transportation because all radioactive waste disposal facilities are built close to the sea.⁶⁸ In the United States truck transportation seems to be preferred because most nuclear power plants are not close to railroads.⁶⁹ Transportation by railroad, therefore, would necessarily include truck transportation, and this would increase the risk of accidents from loading and unloading, and, consequently, the overall expenses.

Given the safety record of radioactive waste transportation, the insignificant increase in accidents when wastes are transported to one facility further away instead of more facilities closer to the place of generation, and the small percentage of waste transfers in comparison to materials transfers,⁷⁰ risks due to waste transportation should not determine the location of waste manage-

alternative #2 [consists of one large incinerator in a remote location]. These are quite small values. The probabilities of more than one accident per year are 0.0009 for alternative #1 and 0.010 for alternative #2 [emphasis in the original].").

⁶⁴ OTA, *Transportation of Hazardous Materials* 25 (1986) [hereinafter *Transportation*]. See also Schwartz, *id.* at 117. In addition, many hazardous materials accidents involve substances, such as gasoline, the transport of which is the least opposed by the public. See *Transportation supra*, at 26 ("gasoline truck accidents and releases are the most numerous and cause the greatest dollar damage.").

⁶⁵ Special trains, for example, that will run at lower speed than regular trains have been proposed for the transportation of radioactive materials. See *Final Environmental Statement, supra* note 60, at J-90-5.

⁶⁶ It is expected that there are more low-severity accidents in high-population-density zones and more severe accidents on freeways because of the higher freeway speeds. The same holds true for railway accidents. See *National Academy of Sciences, Social and Economic Aspects of Radioactive Waste Disposal* 5-12 (1984) [hereinafter *Social and Economic Aspects*]. But see *United States Department of Energy (DOE), Everything You Always Wanted to Know about Shipping High-Level Nuclear Wastes* 14 (DOE/EV-0003, DOE ed. 1978). ("Similarly, we could route shipments around population centers, large or small, but this might well mean using back roads which tend to increase the probability of accidents. Super-highways are safer than two-lane roads, according to the Department of Transportation (DOT).").

⁶⁷ For the disagreements on whether special trains for the radioactive waste transportation are worth the costs. See *Final Environmental Statement, supra* note 60, at J-90-5.

⁶⁸ See *infra* note 174, Chapter 3.

⁶⁹ See *Social and Economic Aspects, supra* note 66, at 11, 52-54.

⁷⁰ See *Transportation, supra* note 64, at 23 (hazardous waste shipments represent less than 1 percent of hazardous materials shipments). See also *Report from the Commission to the European Parliament and Council on the Transport of Radioactive Materials within the European*

ment sites. Hazardous and radioactive waste accidents should not influence the location of hazardous and radioactive waste facilities just as oil and gasoline spills, which are more numerous, do not determine the location of oil industries or distribution stations. In the case of oil spills, for example, the popular demand, after a catastrophic accident, does not involve termination of oil transportation, but merely introduction of double hulls in the ship construction. Accordingly, accidents involving wastes should induce demands for improvement of the transportation infrastructure, and not construction of waste management plants closer to the place of generation or onsite disposal. This is because, in the case of transnational waste management, longer distances from the place of generation may be necessary for better management. As emphasized, transnational facilities take advantage of the economies of scale and are easier to monitor. Ideal hazardous waste sites are also few, and both difficult and expensive to discover because of public opposition and the far from ideal geological conditions of many countries and localities. Endorsing efficiency and effectiveness for waste management, however, presupposes a conception of waste as an integral part of the production process. And this demands an enormous transformation of public attitudes. Because of the resistant to change public attitudes, challenging proximity to the place of generation as the determining factor in waste transfers must not be interpreted as a total disregard for proximity. Construction of transnational facilities close to improved highways or railroads will minimize accidents, and with them, public opposition. The possibility of achieving the optimal – from a public relations perspective – solution of minimization of both waste management plants and waste transfers should be given due consideration. However, concerns about proximity should not override concerns about efficiency and effectiveness.

5.3. Interdependence V. Self-Sufficiency

Transnational waste management is also compatible with inter-regional equity. Inter-regional equity in this study means equity between states. It is well known, though, that states do not possess equal economic power or resources. In fact, certain states are substantially disadvantaged compared to others. Despite the discrepancies in economic power, economic relationships among states are no longer a reproduction of “dependent development” that followed the years of colonialism. The international financial system has rendered states’ wealth closely interdependent. Environmental issues further have stressed the interdependency among states. The ozone convention and protocols, for example, would have been ineffective instruments without the participation of less developed countries that was eventually secured through financial concessions.

Community, at 5, COM(84) 233 final (1984) (1.4 million radioactive material packages are transported worldwide of which only 2 percent are radioactive wastes and spent fuel).

This study endorses the interdependency model as the model that more accurately expresses the dynamics of international relationships. In waste management the interdependency model mandates assistance and cooperation among countries in waste management. According to this model, the “nationality” of wastes must not be instrumental in decisions that determine the country of ultimate disposal. More important to that determination should be the quality and price of services at the place of disposal. Needless to say, the interdependency model opposes waste dumping in developing countries as the cheapest and environmentally unsound waste management. It endorses, however, waste management plans environmentally and financially beneficial for both developed and developing countries.

At the antipode of the interdependency model is the nationalist model that prescribes that the country that generates the wastes should be able to dispose of them. To follow this model, countries must become self-sufficient in waste management. This, paradoxically, must be so even for countries where waste management is politically or financially impossible. Regional waste projects are disfavored because they render certain countries or localities the dumping grounds of the world. In other words, the nationalist model is based on the *static* dimension of wastes. It also perpetuates a conception of the international system as a system comprised of states isolated from one another. The failure of the nationalist model to take into account the *dynamic* dimension of wastes and its perception of states as disconnected entities renders it anachronistic.

The nationalist model, however, has been persuasively dressed in a moralizing language. This language was introduced when no-standards waste transfers to impoverished developing countries started occurring. Efforts to transfer wastes to poor developing countries have been tagged “eco-colonialism” or “new imperialism,”⁷¹ and rightfully so. As mentioned above, the notion of interdependency will be bereft of content, if developing countries simply become inexpensive disposal grounds for first world wastes. In fact, viewing developing countries as cheap waste disposal options is a pure reapplication of the notion of dependent development. Condemning such schemes as immoral, however, is a far cry from espousing a model for international waste transfers that undermines international cooperation in waste management. Furthermore, moral convictions⁷² are not useful prescriptions for the

⁷¹ UNEP Environmental Law and Institutions, The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal 6 (UNEP Environmental Law Library No. 2, ed. 1990) [hereinafter Library 2].

⁷² Moral convictions are not the same as careful moral reasoning. See, e.g., J.S. Nye, Jr., Nuclear Ethics 10–13 (1986). An absolute adoption of the nationalist model – the country that produces wastes must be able to dispose of them – seems to impose a crude sense of justice. It essentially means that even developing countries lacking infrastructure are compelled to ban waste exportation knowing that such a ban will lead to illegal dumping and damage their national resources. Even if the model is construed restrictively – developed countries only must be able to dispose of their wastes – it will again collide with notions of fairness, if certain developed countries do not have the resources or infrastructure to deal with their wastes. In fact, if people under the “veil of ignorance” do not know – in addition to everything else

development of successful international policies. This is especially true for waste transfers. It will be difficult to instill morality in illegal waste traffickers for the same reasons it is impossible to persuade with moral arguments drug dealers or ivory smugglers: they adhere to different legal and moral codes.⁷³ Additionally it is not easy to convince countries viewing waste trade favorably, because of the profits involved, that such trade is morally wrong. Finally, moral arguments are unlikely to sway corporate entities because of the structure and purpose of such entities. Eventually, however, moral persuasion is not even necessary. Wastes are not inherently evil. With appropriate technology they may be minimized or reused. Reuse of wastes saves natural resources. Considering wastes morally reprehensible undermines their management and minimization because it induces reputable waste management enterprises – that could invest in methods of treatment and reduction – to withdraw from waste management. Instead of condemning wastes as evil, what is needed is to liberate them from such characterizations, prevent waste mismanagement, and stimulate transnational waste management.

5.4. Inter-Generational V. Inter-Regional Equity

Transnational waste management is not only in harmony with the interdependency version of inter-regional fairness, but also with inter-generational equity. This is because future generations will inherit fewer and better managed facilities to monitor, and this will facilitate clean-up and post-closure care. Also transnational facilities consume less natural resources than numerous local facilities, and consequently, are more advantageous for future generations. The same cost-benefit analysis holds even when transportation accidents on the way to transnational facilities spoil natural resources. This is because the costs of clean-up of transportation spills will be undertaken by present generations, while the costs of clean-up and monitoring numerous future disposal sites will be incurred by future generations. Even if it is argued that clean-ups, after transportation accidents, are not effective, and that future generations will inherit a degraded environment anyway, the option of transnational facilities must still prevail. The low probability of transportation accidents – compared with the certainty of costs of monitoring and cleaning-up multiple disposal facilities – renders fewer facilities and more transfers the most beneficial option from an inter-generational equity viewpoint.

The most popular objection to transnational waste management originates from the nationalist perception of inter-regional equity. Localities or states where the facilities would be built would fiercely oppose them and claim that it is unfair to impose on them the costs of waste management for the benefits

(nationality, sex, race, class) – whether their country will be exporting or importing wastes, they will allow waste exports, at least, in circumstances where exporting countries do not have facilities and infrastructure to deal with their wastes. The “veil of ignorance” concept is borrowed from Rawls. See J. Rawls, *A Theory of Justice* 12, 118–92 (1971).

⁷³ Pospisil, *Legal Levels and Multiplicity of Legal Systems in Human Societies*, 11 *Journal of Conflict Resolution* 2, at 13–14 (1967).

of industrial production that the whole world has enjoyed. This argument sounds powerful, but surprisingly it is not articulated when a chemical plant is to be constructed. Chemical factories present as many, and perhaps more, problems as those perceived to be caused by hazardous and radioactive waste plants, including fires, explosions, air pollution, and illegal dumping in their backyard. In that case also, a certain state or locality incurs the costs for products enjoyable worldwide. Chemical factories and transnational facilities also offer the same advantages: additional employment in their neighborhood.

The different public attitude toward chemical plants and waste management facilities is due to the controversy surrounding wastes, a controversy that the chemical industry has never had to face to the same extent. This is because of the years of hazardous waste mismanagement and government secrecy concerning radioactivity. As emphasized in the relevant literature, the public's bias against wastes will be difficult to obliterate. Yet education, participation in the decisionmaking process, and financial incentives have been proposed as potential transformative mechanisms of public attitudes.⁷⁴ It is certain, though, that the process will be slow⁷⁵ and it may be years before the problem of hazardous and radioactive waste is finally resolved. Until such resolution, it is highly possible that inter-generational equity will be jeopardized for the short-term gains of the nationalist version of inter-regional fairness.

6. METHODS: WASTE TRADE AND EXCHANGES

As will be emphasized in Chapter 3, the waste management industry has grown immensely. Further potential for growth seems quite promising given the increase of environmental awareness in Eastern Europe and developing countries. The waste management market has been dominated by big industries. Lately, big corporations have increasingly begun to internationalize and consolidate, and Western European countries have started to privatize their state-owned facilities.

What we are witnessing, therefore, is the development of a robust waste management industry. A strong waste management industry will be instrumental in curtailing illegal waste disposal. Wastes, for waste management enterprises, are not *static*, valueless materials that could be just disposed of in any fashion. They are commodities. Waste management industries thus view wastes in a *dynamic* fashion. This transcendence from the *static* to the *dynamic* dimension, effectuated by the waste management industry, can considerably improve waste management. This is because industries, and especially the larger corporations that dominate the waste management market, fearful of

⁷⁴ Forcade, Public Participation in Siting, in *Hazardous Waste Management: In Whose Backyard?* 111 (1984).

⁷⁵ C.A. Walker, L.C. Gould and E.J. Woodhouse, *Too Hot to Handle* 120 (1983).

besmirching their reputation, are less likely to engage in illegal waste transfers. In fact, they have every incentive to expose illegal traffickers because illegal trafficking hurts their good name and profitability. Bigger industries also can carry risk and are unlikely to disappear after the construction of a facility.⁷⁶ Furthermore, because they have more resources, they can invest in innovative technologies and comply with regulatory requirements. A big industry, for example, will be more capable of handling the complications and delays of the prior notification and informed consent requirement.

Prohibitions and restrictions on the movements of commodities on which an increasingly internationalized waste management industry relies for its profits will certainly damage the further development of that industry. Prohibitions and the proximity and self-sufficiency principles will deprive the industry of global waste markets, and the potential for expansion and growth. Parochial tendencies will deny regions without an indigenous waste management industry possibilities to export their wastes. Increased localization will prevent the development of economies of scale and the formation of transnational facilities. Local facilities will be smaller and less integrated than regional facilities, and since they will be restricted or prohibited to accept other regions' waste they would be planned modestly. Modest plans would fail to cope with future surges in waste production and hence contribute to an increase in illegal disposal because of the *static* dimension of wastes. Also despite the resources of the industry, a too obstructive prior notification and informed consent requirement could adversely affect it. This is because such a requirement is dependent on inherently slow government bureaucracies. A prior notification and informed consent procedure that lasts more than few hours⁷⁷ will significantly increase the costs of waste management and provide incentives for illegal behavior.⁷⁸

A potential danger of transnational waste management is that efficiency may overrule effectiveness. Generators, because they view wastes as valueless materials, are likely to transfer them to the cheapest integrated facility and not to the most effective one, or even worse transfer them to no-standards landfills. It has to be underlined, however, that the goal of the policy prescribed here is not to induce waste transfers to the most effective – from the perspective of aggressive advancement of waste management – facility but to prescribe certain threshold conditions for sound waste management. All the facilities meeting these conditions are, for the purposes of this study, effective. It is also possible that, in the beginning, no-standards landfills still in existence will compete with integrated facilities and minimize the profits of such facilities. But it is equally plausible that generators, running the risk of severe penalties,

⁷⁶ Survey, *supra* note 4, at 7.

⁷⁷ Longer notification and informed consent procedures are becoming increasingly unjustifiable because of the modern communication technologies.

⁷⁸ Experience with similar domestic systems has also demonstrated that over-reliance on prior notification and informed consent, for detecting illegal traffickers, is unwarranted. *See infra* note 146, Chapter 5.

they violate the prescribed international standards, will take into account other factors, such as the reputation of the facility, the experience of the operators, and the general quality of the services provided. These factors will be even more decisive, if the costs of waste management at integrated facilities are reasonable. It is crucial, therefore, to strengthen the competitiveness of the waste management industry by providing unrestricted access to global waste markets.⁷⁹

It could also be claimed that the minimum standards are incompatible with transnational waste management since they legitimize land disposal. Minimum standards, according to this argument, could transform waste trade between transnational facilities into waste trade between minimum standards landfills. Minimum standards could also discourage innovation.

This claim disregards that minimum standards are part of a larger international code inclusive of other waste management practices. In this international code it will be stressed that minimum standards have a minimal character. Other clear, specific and non-technology-forcing standards will also be included. It is very unlikely that an all-method-encompassing waste management code would convince industry to solely engage in land disposal and abandon all other waste management practices. In fact, frequently, big corporations, for various reasons, are willing to exceed minimum standards and aim at higher levels of environmental protection.⁸⁰ Another factor that will avert increasing use of land options is limited space in an era of competing claims for land use. The shortage of land space should precipitate the development of integrated regional facilities offering multiple treatment options which can reduce wastes and lessen the dependence on land. An international code also, inclusive of minimum standards, will not jeopardize innovation since standards for new waste management methods will be contained in the code. But it will not advance innovation either. This is not, after all, as mentioned above, the code's purpose. Incentives, however, such as tax exemptions, may be provided at the domestic level to bolster innovation. Domestic systems may also provide incentives for waste minimization at the source, but such incentives may clash with the development of the waste management industry. The waste management industry may oppose waste minimization efforts because of the negative impact of such efforts on its profitability. Ironically, the industry that assists in sound waste management may frustrate the ultimate goal of such management.

Yet source minimization may not always be desirable. It will not be desirable if the waste management industry develops to an extent that makes possible reuse of most wastes and, thus, less use of scarce raw materials. Waste management industries will also rarely oppose waste minimization

⁷⁹ Access to global waste markets has helped the United States waste management industry in a period of recession and fierce domestic competition from small landfill owners. *See* Chapter 3, Section 2.1.

⁸⁰ *See* Stewart, *Environmental Regulation and International Competitiveness*, 102 *Yale Law Journal* 2039, at 2070 (1993).

plans because they are aware that the materialization of such plans is often elusive since governments tend to be protective of their waste generating industries, especially during periods of economic anguish. Waste management companies, furthermore, are not primarily or solely waste management enterprises;⁸¹ thus, they are not exclusively dependent on waste management for their profits. Diversification and access to international waste markets will render them less sensitive to local shifts in waste production, and therefore, less apt to oppose local waste minimization plans. Finally, it should be emphasized that waste minimization does not mean total waste eradication. Some wastes will always be generated and must be soundly treated. Waste minimization efforts may change the face of the waste management industry, but they are unlikely to obliterate it.

The ultimate goal of waste minimization and potential reluctance of the private companies to operate in less stable and less promising markets render imperative national and international coordination. Transnational authorities must keep track of the wastes generated and waste management projects and prices, and accordingly arrange for other transnational projects or aggregate waste exports from disadvantageous regions where wastes are unsoundly managed. Such projects could be assigned to the private sector, the growth of which is important for sound waste management. Waste trade may also take innovative shapes, such as interstate waste swaps. Swaps have been initiated within the European Community for radioactive wastes.⁸² They do not, however, have to be confined to radioactive wastes. They may involve exchanges between countries or industries of the same or different types of wastes – including hazardous, radioactive, or solid. Swaps, for instance, will make it possible for developing countries to exchange their smaller hazardous waste production for the larger solid waste volumes of developed countries. In this manner, developing countries will be guaranteed access to the state-of-the-art facilities in developed countries – facilities otherwise financially inaccessible to them. Waste exchanges offer possibilities that the drafters of the Bamako Convention should have at least considered.

⁸¹ See Survey, *supra* note 4, at 8.

⁸² See Chapter 3, Section 2.4.

CHAPTER 2

The International Regulation of Wastes and Related Liability Regimes

This Chapter examines the international waste legislation and the international private liability regimes. This examination elucidates the differences between the proposed and existing legislation. Advantages and shortcomings of liability regimes have provided useful insights for the prescription of a liability regime for international waste transfers.

1. REGULATING MARINE POLLUTION

1.1. *Case-by-Case Regulation*

Marine waste disposal is regulated by the London Dumping Convention (LDC).¹ The Convention defines dumping as any deliberate waste disposal at sea.² It does not cover waste disposal resulting from the normal operations of vessels,³ or from the offshore processing of sea-bed mineral resources.⁴ It regulates waste dumping by establishing three lists: the black, grey and white. The black list – Annex I of the Convention – includes wastes considered the most dangerous.⁵ The dumping of these wastes is prohibited,⁶ but with exceptions. Only high-level radioactive wastes that the IAEA has specifically defined for the purposes of marine disposal⁷ are absolutely banned. The other

¹ Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, Dec. 29, 1972, 26 U.S.T. 2403, T.I.A.S. No. 8165, 1046 U.N.T.S. 120 [hereinafter LDC].

² *Id.*, Art. III(1)(a).

³ *Id.*, Art. III(1)(b).

⁴ *Id.*, Art. III(1)(c).

⁵ These consist of: organohalogen compounds, mercury and mercury compounds, cadmium and its compounds, persistent plastics, crude oil and its wastes, materials produced for biological and chemical warfare, and high-level radioactive wastes. *See id.*, Annex I.

⁶ *Id.*, Art. IV (1)(a).

⁷ *See* The IAEA Revised Definition and Recommendations of 1978 Concerning Radioactive Wastes and Other Radioactive Matter Referred to in Annexes I and II to the London Dumping

prohibitions are not applicable when wastes "are rapidly rendered harmless by physical, chemical, or biological processes in the sea" as long as they do not render edible marine organisms unpalatable and do not endanger the health of humans or that of domestic animals. Prohibitions also do not apply to wastes, for example, sewage sludge or dredged spoils, containing the black list substances as trace contaminants.⁸ The "trace contaminants" and "harmlessness" provisions dilute to a great extent the absolute prohibitions contained in Annex I and have not been adequately clarified in the 1978 interim guidelines adopted by the state parties.⁹ The guidelines essentially leave the methods of implementation of the "trace contaminants" and "harmlessness" provisions up to individual states.¹⁰

The grey list – Annex II – includes wastes perceived as less dangerous than the Annex I wastes.¹¹ The dumping of these wastes cannot take place without prior special permits issued by national governments.¹² The white list – Annex III – includes all other wastes that can be dumped after the issuance of a general permit. National authorities must issue general and special permits after taking into consideration the waste characteristics,¹³ the

Convention, reprinted in *New Directions of the Law of the Sea J2* (K.R. Simmonds ed. 1983) [hereinafter *New Directions*]. The IAEA has defined high-level radioactive wastes according to the concentration of radioactivity. The dumping of low- and intermediate-level wastes is subject to environmental impact assessment. *Id.*, para. B.1.1. The IAEA has also enacted specific guidelines for radioactive waste packaging and monitoring of the marine radioactive waste disposal. *See id.*, paras. C.1, C.3 & C.5. "The dumping operation shall be supervised by approved escorting officers representing the national authorities granting the dumping permits [emphasis in the original]." *Id.*, para. C.5.1.1. Past practices, however, were characterized by a total disregard of international standards. For example, drums containing radioactive wastes, that would not sink, were fired with machine-guns until they sank. *See Tyler, Soviets' Secret Nuclear Dumping Raises Fears for Arctic Waters*, N.Y. Times, May 4, 1992, at A1, col. 1.

⁸ LDC, *supra* note 1, Annex I, paras. 8–9.

⁹ Amendments on dispute settlement procedure and regulations on incineration of waste, Annex 6, Dec. 1, 1978, reprinted in *New Directions J1* (1983).

¹⁰ *See id.*, Appendix I, para. 2 (state parties must develop and use "test procedures" to determine whether the "trace contaminants" and "harmlessness" conditions exist. Such test procedures may include chemical characterization, bioassays, application of emission standards or environmental quality criteria used by state parties, scientific literature or results of field surveys of the proposed disposal site. Given that test procedures are not sufficiently advanced, their application does not necessarily mean that the disposal of dangerous substances in the marine environment will be precluded).

¹¹ Annex II includes: (1) Wastes containing significant amounts of: arsenic, lead, copper, zinc, beryllium, chromium, nickel, vanadium, organosilicon compounds, cyanides, fluorides, pesticides not included in Annex I, and low-level radioactive wastes. (2) Bulky wastes such as containers and scrap metal liable to sink to the sea bottom that may seriously harm fishing and navigation. (3) Non-toxic substances which may become harmful because they are dumped in large quantities, or substances which are liable to seriously reduce amenities. *See LDC, supra* note 1.

¹² *Id.*, Art. IV (1)(b).

¹³ These characteristics include: the amount, composition, form, properties, toxicity, persistence, accumulation of wastes, susceptibility to physical, chemical and biochemical changes, interaction with the marine environment, and possibility to produce taints that reduce the marketability of marine resources. *See id.*, Annex III.

dumping site¹⁴ and disposal method, the effects of dumping on marine life, other uses of the sea, as well as the possibility of application of alternative land-based solutions.

The LDC attempts to control dumping in the territorial sea¹⁵ and the high seas,¹⁶ but not in the internal waters of state parties.¹⁷ The Convention is silent regarding waste dumping in the Exclusive Economic Zone (EEZ) because it was concluded before the Law of the Sea Conference that first defined the EEZ. In 1988, the LDC Eleventh Consultative Meeting decided that the scope of the Convention should be extended to include the EEZ.¹⁸ The implementation of the Convention is left to flag states, port states, and coastal states in their territorial sea.¹⁹ For the enforcement of the Convention in the high seas state parties have agreed to cooperate.²⁰

The LDC regulates rather than prohibits waste dumping. As emphasized even the black waste list contains exceptions, and the grey and white lists hardly contribute to the harmonization of national legislation since special and general permits are issued unilaterally by national authorities. Reports on the effectiveness of the Convention have been mixed. The amount of industrial wastes dumped in the oceans has decreased from seventeen million tons in 1979 to six million tons in 1987.²¹ Although the dumping of sewage sludge significantly increased between 1976–1980, it decreased during the 1980–1988 period.²² The same is not true with dredged materials, 260 million

¹⁴ The characteristics of the site include: location, rate of disposal, water, dispersal and bottom characteristics. *See id.*

¹⁵ *Id.*, Art. III(3). In the territorial sea, a state is sovereign, but its sovereignty is limited by the right to innocent passage.

¹⁶ No state has jurisdiction over the high seas. *See* Convention on the High Seas, April 29, 1958, 13 U.S.T. 2312, T.I.A.S. No. 5200, 450 U.N.T.S. 82. *See also* International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, Nov. 29, 1969, 9 I.L.M. 25 (1970).

¹⁷ In its internal waters a state is sovereign and can prescribe and enforce its domestic or international legislation.

¹⁸ *See* Note by the Secretariat, Review of Proposed and Adopted Amendments to the Convention, Fifteenth Consultative Meeting of Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, Agenda item 3, at 6, LDC 15/INF. 14 (Oct. 23, 1992). *See also* Convention on the Law of the Sea, Dec. 10, 1982, reprinted in 21 I.L.M. 1261 (1982) [hereinafter UNCLOS III]. According to UNCLOS III, article 210(5), dumping within the EEZ or in the continental shelf shall not take place without the prior approval of the coastal state. For a critique of the UNCLOS III, *see* Bodansky, Protecting the Marine Environment from Vessel-Source Pollution: UNCLOS III and Beyond, 18 Ecology Law Quarterly 719 (1991).

¹⁹ LDC, *supra* note 1, Art. VII (1). This jurisdiction is concurring. *See* GR. J. Timagenis, International Control of Marine Pollution 234 (1980).

²⁰ LDC, *supra* note 1, Art. VII(3).

²¹ Note by the Secretary General of the UN Conference on the Environment and Development on the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter, U.N. Doc. A/CONF.151/PC/31, Jan. 28, 1991, reprinted in New Directions J.43, at 3 (1991).

²² *Id.* at 4.

tons of which are dumped annually in the seas.²³ This partial success of the Convention has been attributed to the implementation of alternative disposal methods, waste reuse, and application of cleaner technologies.²⁴

The reported figures, however, are not very reliable because they are incomplete. This is because only 30 percent of the state parties report to the Secretariat of the Convention.²⁵ Of those reporting, 90 percent are industrialized countries, but the reports submitted are not comprehensive.²⁶ Developed countries' lack of enthusiasm about reporting has been attributed to the difficulties of assembling information and the higher priority assigned to other activities.²⁷ Lack of reports from developing countries is due, on the other hand, to poor infrastructure, inappropriate technology and unskilled staff.²⁸ Inadequate reporting has undermined the confidence in the effectiveness of the Convention.²⁹ The Convention's appeal to the developing world is not on the rise either. The number of accessions to the Convention has significantly slowed down during the last decade. Less developed countries have been reluctant to adopt the Convention either because they produce less wastes or because they lack the resources to implement it.³⁰

The LDC followed in the footsteps of the Oslo Convention for the prevention of waste dumping from ships and aircraft.³¹ Subsequently, the model of black, grey and white lists has been employed in most sea-dumping conventions, and conventions on the prevention of marine pollution from land-based sources, such as the Paris Convention,³² as well as comprehensive conventions – conventions encompassing marine pollution from all sources – such as the Helsinki Convention.³³ The LDC has also influenced the development of the UNEP Regional Seas Programme. The regional seas conventions are comprehensive conventions, but they are devoid of substance and precision. They

²³ *Id.*

²⁴ *Id.*

²⁵ GAO, *International Environment: International Agreements Are Not Well Monitored* 26 (RCED-92-43, ed. 1992) [hereinafter *Not Well Monitored*].

²⁶ *Id.*

²⁷ *Id.*

²⁸ *Id.*

²⁹ *Id.*

³⁰ See *supra* note 21, at 12.

³¹ See Oslo Convention for the Prevention of Marine Pollution by Dumping from Ships and Aircraft, Feb. 15, 1972, reprinted in II New Directions 670. The parties to the Oslo Convention are: Belgium, Denmark, Germany, Finland, France, Iceland, the Netherlands, Norway, Portugal, Spain, Sweden, and the United Kingdom. The Annexes to the Oslo Convention and LDC are not identical. In many respects the London Annexes are more comprehensive, but substances included in Annex II of London are included in Annex I of Oslo, for example, organosilicon compounds.

³² Paris Convention for the Prevention of Marine Pollution from Land-Based Sources, June 4, 1974, IV New Directions 499.

³³ Helsinki Convention on the Protection of Marine Environment of the Baltic Sea Area, Mar. 22, 1974, reprinted in 13 I.L.M. 546 (1974) [hereinafter *Helsinki Convention*]. The parties to this Convention are: Denmark, Germany, Finland, Poland, Sweden, and Russia.

are merely agreements to cooperate,³⁴ and create the institutional framework that enhances such cooperation.³⁵ In certain instances, they are followed by protocols that tend to be more specific and conceptually similar to the LDC.³⁶

The comprehensive conventions, and the conventions controlling pollution from land-based sources have been criticized as ineffective.³⁷ The ineffectiveness has been attributed to the lack of political will especially in regions where developed and developing countries co-exist, such as the Mediterranean region.³⁸ Developing countries have strongly resisted imposition of controls on their development for the sake of environmental protection. Developed countries, on the other hand, do not yet conceive marine pollution as a problem of similar magnitude to ozone depletion, which compels financial concessions to the developing world. In less developed regions, therefore, provisions for the protection of the marine environment are encountered hand-in-hand with clauses underlining that environmental protection should not thwart development.³⁹ Another factor that may have contributed to the ineffectiveness of the conventions is the absence of a systematic approach to

³⁴ See Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention), Feb. 16, 1976, reprinted in 15 I.L.M. 290 (1976). For a sharp critique of the Barcelona Convention, see M'Gonigle, "Developing Sustainability" and the Emerging Norms of International Environmental Law: The Case of Land-Based Marine Pollution Control, XXVIII The Canadian Yearbook of International Environmental Law 169, at 191 (1990). See also Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment Against Pollution, April 24, 1978, reprinted in 17 I.L.M. 511 (1978); Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific (Lima Convention), Nov. 12, 1981, reprinted in New Directions J.18 (1984). The geographical coverage of this Convention is more extensive than that of the other Conventions. It includes "the coastal zone of the South-East Pacific within the 200-mile maritime area of sovereignty and jurisdiction of the High Contracting Parties and, beyond that area, the high seas up to a distance within which pollution of the high seas may affect that area." See also Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah Convention), Feb. 14, 1982, reprinted in New Directions J.19, *supra*; Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention), Mar. 24, 1983, reprinted in New Directions J.17, *supra*; Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, Mar. 23, 1981, reprinted in New Directions J.4 (1983).

³⁵ M'Gonigle, *id.* at 207.

³⁶ See Convention for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources (Athens Protocol to the Barcelona Convention), May 17, 1980, reprinted in S. Kuwabara, The Legal Regime for the Protection of the Mediterranean Against Pollution from Land-Based Sources, Annex III (1984). See Protocol for the Protection of the South-East Pacific Against Pollution from Land-Based Sources (Quito Protocol to the Lima Convention), July 22, 1983, reprinted in New Directions J.18 (1984).

³⁷ M'Gonigle, *supra* note 34, at 210.

³⁸ *Id.* at 190.

³⁹ See Convention for Co-operation in the Protection and Development of the Marine Environment of the West and Central African Region [emphasis added], *supra* note 34. Under article 4(1) of this Convention countries undertake to fight pollution by using the best practicable technology at their disposal in accordance with their capabilities. See also Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region [emphasis added], see *supra* note 34.

marine pollution. A systematic approach would dictate cooperation between the authorities regulating lakes and rivers flowing into the sea and authorities dealing with sea pollution.⁴⁰ The paralysis of decisionmaking caused by scientific uncertainty regarding the interactions between hazardous substances and the marine environment has also hampered the implementation of many conventions.⁴¹

In general, the regulation of marine pollution has been tackled in a piecemeal fashion and on a regional basis, with the exception of the LDC. This should not be surprising. Novel issues tend to be approached in a fragmented manner until accumulation of experience reveals their full dimensions. This piecemeal approach could also be attributed to perceptions that the protection of regional seas is a regional problem in which the international community has no stakes and, consequently, cannot effectively regulate.⁴²

1.2. From Regulation to Prohibitions?

In 1983 state parties to the LDC adopted a two year moratorium that suspended all radioactive waste dumping.⁴³ The ban was extended indefinitely in 1985 to allow for accumulation of stronger scientific evidence.⁴⁴ In 1990 a Resolution was also adopted that broadens the LDC's sea definition to include the sub-sea bed.⁴⁵ The purpose of this Resolution was to extend the prohibition of high-level radioactive waste dumping to the sub-sea bed.

These prohibitions have not been precipitated by the deterioration of the oceans because of radioactive waste dumping. In fact, low-level radioactive waste dumping had decreased during the preceding years,⁴⁶ and high-level radioactive waste dumping was explicitly prohibited in the LDC. The bans were triggered, instead, by Japan's decision to dump low-level radioactive waste in the Pacific ocean.⁴⁷ This decision has been feverishly opposed by the Pacific islands led by Nauru and Kiribati and, in the absence of firm sci-

⁴⁰ See Kwiatkowska, *Marine Pollution from Land-Based Sources: Current Problems and Prospects*, 14 *Ocean Development and International Law* 315, at 325 (1984).

⁴¹ McManus, *Legal Aspects of Land-Based Sources of Marine Pollution*, in *New Nationalism and the Use of Common Spaces* 90, at 97 (Charney ed. 1982).

⁴² See McManus, *id.* at 91. But see M'Gonigle, *supra* note 34, at 17. See also Kwiatkowska, *supra* note 40, at 318 underlining the need for international legislation that would serve as a guide for regional conventions.

⁴³ Seventh Consultative Meeting of the London Dumping Convention, Consideration of the Proposed Amendments to the Annexes of the Convention, IMO Doc. LDC 7/12, Res. LDC. 14(7) (1983).

⁴⁴ See Ninth Consultative Meeting of the London Dumping Convention, Dumping of Radioactive Wastes, IMO Doc. LDC 9/12, Annex 4, Res. LDC. 21(9) (1985).

⁴⁵ See Thirteenth Consultative Meeting of the Contracting Parties to the London Dumping Convention, IMO Doc. LDC 13/17, Annex 7, Res. LDC 41(13) (1990) [hereinafter Thirteenth Meeting].

⁴⁶ Spiller and Hayden, *Radwaste at Sea: A New Era of Polarization or a New Basis of Consensus?*, in 19 *Ocean Development and International Law* 345, at 346-47 (1988).

⁴⁷ *Id.* at 347.

entific evidence, has led to confrontation. One camp includes countries that produce nuclear energy – Belgium, France, Japan, the United Kingdom and the United States – and wish to leave open the option of radioactive waste dumping. Such disposal may be necessary, for instance, because of the high-population density in Japan and Belgium, and the public opposition in most countries to land disposal.⁴⁸ In the other camp are Spain, Norway, Finland, Iceland, Ireland and the Pacific islands. The Pacific islands with economies almost exclusively dependent on fisheries and tourism, are strong opponents of radioactive waste dumping.⁴⁹ These tensions, which were noticeable in the 1992 LDC Consultative Meeting,⁵⁰ are bound to plague the special Consultative Meeting to be held in 1994 to discuss the proposed amendments to LDC. The proposed amendments include: prohibition of industrial waste disposal, of waste incineration at sea and of waste exports for sea disposal; the adoption of precautionary and polluter pays principles; redefinition of “sea” to include the internal waters and the sub-sea bed; and the reverse listing mechanism.⁵¹

The issue of radioactive waste dumping has been prevalent in regional fora as well. The Convention for the Protection of the Marine Environment of the North East Atlantic⁵² that replaces the Oslo and Paris Conventions has banned the dumping of low- and intermediate-level radioactive wastes. However, it grants exceptions to the United Kingdom and France until 2008, if they undertake to report by 1997 on steps taken to explore alternative land-based options. A similar report, or scientific evidence that sea disposal is not harmful to other legitimate uses of the sea is necessary, if the exceptions are to be extended beyond 2008.⁵³ The South-East Pacific countries have banned the dumping of radioactive wastes and other such substances.⁵⁴ The ban extends to the EEZ, the sea-bed and the marine subsoil.⁵⁵ The South-East Pacific countries have also stipulated that, in case of doubt, substances will be deemed radioactive pending confirmation by the Secretariat of the Convention that must take into account the IAEA recommendations.⁵⁶ Nuclear waste

⁴⁸ *Id.* at 346–47.

⁴⁹ *Id.* at 353.

⁵⁰ “Big-Four” Nuclear Powers to Oppose Sea-Dumping Ban, Inter Press Service, Nov. 9, 1992 (Lexis, Nexis, Omni File).

⁵¹ According to the reverse listing mechanism, the substances included in the annexes would be those allowed to be dumped. In this manner, the burden of proof is shifted to interests that wish to engage in dumping. *See* Scientific and Technical Aspects of Amending the London Convention 1972, Scientific Group–16th Meeting, 10–14 May, Agenda Item 2, LC/SG 16/2 (Jan. 26, 1993).

⁵² Convention for the Protection of the Marine Environment of the North East Atlantic, Sept. 22, 1992, reprinted in *New Directions* J.49 (1993) [hereinafter *North-East Atlantic Convention*].

⁵³ *Id.*, Annex II, Art. 3(3).

⁵⁴ Protocol to the 1981 Convention for the Protection of the Marine Environment and Coastal Areas of the South-East Pacific Against Radioactive Pollution, Sept. 21, 1989, reprinted in *New Directions* J.34 (1990).

⁵⁵ *Id.*, Art. II.

⁵⁶ *Id.*, Art. IV.

dumping is also banned in the Convention for the protection of the South Pacific Region.⁵⁷ The ban applies to the EEZ⁵⁸ and includes the sea-bed and subsoil.⁵⁹

On the other hand, industrial waste dumping has encountered considerably less opposition. States frequently set targets to curtail industrial waste dumping,⁶⁰ but such targets are infrequently met. For example, following a 1989 Decision of the Oslo Commission to phase out industrial waste dumping in the North Sea by 1995,⁶¹ the Ministerial Meeting of the Oslo and Paris Commissions moved the deadline back to 2005.⁶² Moreover, declarations to ban industrial waste dumping are easily pronounced since such dumping constitutes only 10 percent of marine pollution.⁶³ On the other hand, dredged material – which comprises a large portion of sea pollution – is not subject to the same target dates.⁶⁴

Despite the small percentage of industrial waste dumping, less developed regions have been unwilling to prohibit such dumping. The Convention on the protection of the Black Sea⁶⁵ simply provides that states should take measures to prevent, reduce and control regional pollution from dumping. The Convention for the protection of the South Pacific⁶⁶ stipulates that states must prevent and reduce marine pollution in accordance with their capabilities. Protocols on industrial waste dumping⁶⁷ merely regulate such dumping in

⁵⁷ See Convention for the Protection of Natural Resources and Environment of the South Pacific Region, Nov. 25, 1986, reprinted in *New Directions* J.27 (1990) [hereinafter *South Pacific Convention*].

⁵⁸ *Id.*, Art. 2.

⁵⁹ *Id.*, Art. 10.

⁶⁰ The parties to the LDC have agreed to ban the dumping of industrial wastes at sea by 1995, Thirteenth Meeting, *supra* note 45, Annex 9. A ban on industrial waste dumping has been adopted also by the parties to the North-East Atlantic Convention. See *supra* note 52.

⁶¹ See OSCOM Decision 89/1 on the Reduction and Cessation of Dumping Industrial Wastes at Sea, Fifteenth Meeting of the Oslo Commission, Ireland, June 14, 1989.

⁶² Draft Final Declaration of the Ministerial Meeting of the Oslo and Paris Commissions, Sept. 21–22, 1992, Agenda Item 6, reprinted in *New Directions* J.48 (1993).

⁶³ See Chapter 3, Section 1.2.

⁶⁴ North-East Atlantic Convention, *supra* note 52, Annex II, Art. 3(2)(a). The Helsinki Convention as amended in 1992 similarly prohibits industrial waste dumping except for dredged material that can be dumped only with a special permit. See Art. 11, Convention on the Protection of the Marine Environment of the Baltic Sea, April 9, 1992, reprinted in *New Directions* J.47 (1993) [hereinafter *Helsinki Convention*]. The Convention, unlike its predecessor, applies not only to the territorial sea, but also to the internal waters. See *supra* note 33.

⁶⁵ See Convention on the Protection of the Black Sea Against Pollution, April 1, 1992, reprinted in *New Directions* J.46 (1993) [hereinafter *Black Sea Convention*]. State parties to this Convention are: Bulgaria, Georgia, Romania, Russia, Turkey and Ukraine.

⁶⁶ See *supra* note 57.

⁶⁷ See Protocol on the Protection of the Black Sea Marine Environment Against Pollution by Dumping, April 1, 1992, reprinted in *New Directions* J.46 (1993). Protocol for the Prevention of Pollution of the South Pacific Region by Dumping, Nov. 25, 1986, reprinted in *New Directions* J.27 (1990).

a manner similar to the LDC without commitments to specific targets and deadlines.⁶⁸

Both developed and developing countries are even more reluctant to abate pollution from land-based sources, which constitutes the bulk of marine pollution.⁶⁹ The reduction of pollution from land-based sources in the final Declaration of the Ministerial Meeting of the Oslo and Paris Commissions is subject to deadlines, but without specific levels of pollution reduction, the deadlines sound like wishful thinking. The Ministerial Declaration provides that discharges of substances that are toxic, persistent and liable to bioaccumulate must be reduced by the year 2000 – not to specific levels, but to levels that do not harm human health or the nature. Other substances likely to cause eutrophication must only be reduced.⁷⁰ The North-East Atlantic Convention has not incorporated the 2000 deadline. It provides that discharges from land-based sources will be authorized by state parties. Authorization must be in accordance with the binding decisions of the North-East Atlantic Commission established under the Convention⁷¹ – that is, subject to more negotiation and balancing of interests of the state parties. The 1992 Helsinki Convention⁷² also does not outlaw pollution from land-based sources, but uses more stringent language than its predecessor, and regulates dumping in the internal waters – waters principally polluted by land-based sources.⁷³ Annex III of the Convention calls for the application of the best environmental practice (BEP), and best available technology (BAT), and establishes guidelines for the issue of permits.

In less developed regions pollution from land-based sources is similarly less controlled. For example, frequently protection does not extend to internal waters.⁷⁴ The South Pacific Convention,⁷⁵ which has banned nuclear waste dumping, provides simply that the state parties “shall take all appropriate measures to prevent, reduce and control pollution” from land-based sources.⁷⁶ The Quito protocol⁷⁷ to the Lima Convention⁷⁸ is a regulatory instrument similar to the LDC and it is in stark contrast with the protocol that bans the dumping of radioactive wastes and substances in the South-East Pacific.⁷⁹

⁶⁸ The annexes to these protocols are more inclusive than the LDC Annexes. Lead, for example, is included in Annex I of the Protocol to the Convention for the protection of the Black Sea. *See id.*

⁶⁹ *See* Chapter 3, Section 1.2.

⁷⁰ *See supra* note 62.

⁷¹ North-East Atlantic Convention, *supra* note 52, Annex I, Art. 2(1).

⁷² *See supra* note 64.

⁷³ *Id.*, Art. I.

⁷⁴ *See, e.g.,* Black Sea Convention, *supra* note 65, Arts. I(2) and V(1).

⁷⁵ *See supra* note 57.

⁷⁶ *Id.*, Art. 7.

⁷⁷ *See supra* note 36.

⁷⁸ *See supra* note 34.

⁷⁹ *See supra* note 54.

Overall the most recent conventions are more comprehensive and substantive. A good example is the North-East Atlantic Convention that replaces the Oslo and Paris Conventions. Developed regions tend to adopt more stringently articulated conventions. Developed countries, for example, have adopted the precautionary⁸⁰ and polluter pays principles⁸¹ and have endorsed the BAT and BEP.⁸² Developed states have also prohibited incineration at sea⁸³ and adopted provisions for access to information.⁸⁴ However, monitoring and implementation mechanisms are still weak. None of the new Conventions establishes liability rules. In the absence of specific standards and liability rules, the precautionary and polluter pays principles have only declaratory value.⁸⁵ Also countries that have recently become independent demonstrate reluctance to be bound by international and regional rules that may infringe upon their sovereignty.⁸⁶

Countries willing to ban industrial waste dumping are unwilling to end the major source of marine pollution – pollution from land-based sources. Developing countries, especially, while seeking to ban radioactive waste dumping, do not seem so keen on preventing industrial waste dumping and other forms of marine pollution. This attitude could be attributed to the painful experience associated with nuclear testing in the Pacific or to the potential impact of radioactive wastes on economies dependent on fisheries and tourism.

Nevertheless, toxic waste and sewage sludge dumping may equally affect fisheries and tourism. And this is not stressed to contest the fact that nuclear testing and economic considerations have contributed to polarization on the issue of nuclear waste dumping. It is stressed to indicate that the confrontation is also due to another factor. Radioactive wastes are principally generated by certain developed countries, while all countries produce some quantities of industrial wastes. Furthermore, radioactive wastes have been associated

⁸⁰ See, e.g., North-East Atlantic Convention, *supra* note 52, Art. 2(2)(a). See also 1992 Helsinki Convention, *supra* note 64, Art. 3(2).

⁸¹ See North-East Atlantic Convention, *supra* note 52, Art. 2(2)(b). See also 1992 Helsinki Convention, *supra* note 64, Art. 3(4).

⁸² See North-East Atlantic Convention, *supra* note 52, Annex I, Art. 1(1). See also 1992 Helsinki Convention, *supra* note 64, Art. 3(3).

⁸³ See, e.g., North-East Atlantic Convention, *supra* note 52, Annex II, Art. 2. See also 1992 Helsinki Convention, *supra* note 64, Art. 10.

⁸⁴ See, e.g., North-East Atlantic Convention, *supra* note 52, Art. 9.

⁸⁵ For an insightful discussion of the precautionary principle, see Gündling, *The Status in International Law of the Principle of Precautionary Action*, in *North Sea: Perspectives on Regional Environmental Co-operation* 23 (1990).

⁸⁶ "The Contracting Parties take part in this Convention on the basis of full equality of rights and duties, respect for national sovereignty and independence, non-interference in their internal affairs, mutual benefit and other relevant principles and norms of international law." See Black Sea Convention, *supra* note 65, Art. III. "Each Contracting Party shall adopt rules and regulations on the liability for damage caused by natural and juridical persons to the marine environment of the Black Sea in areas where it exercises, in accordance with international law, its sovereignty, sovereign rights or jurisdiction." See Black Sea Convention, *supra*, Art. XVI.

exclusively with the production of nuclear power, while industrial wastes are identified with overall development. In other words, radioactive waste dumping does not bring to the fore the divergent interests of “preservationist” and “polluting” states. All states pollute the seas to a certain degree. The origins of the controversy run much deeper in attitudes that tolerate pollution generated by everyone, but resent pollution generated solely by someone else.

1.3. *Evaluation vis-à-vis the Minimum Standards*

Most national and international regimes dealing with environmental pollution attempt to regulate such pollution by introducing standards, incentives, implementation and enforcement mechanisms. Prohibitions are desirable only in cases where development will not be adversely affected⁸⁷ and are promoted by constituencies that do not generate a particular form of pollution.⁸⁸ An overall ban on marine pollution would suffocate development because it would entail either the abolition of most industrial activities – a politically unacceptable solution – or would shift marine pollution to land, which is hardly a desirable alternative.

Since some type of regulation of pollution is inevitable, the real issue is how to best regulate. The model supplied by the LDC has had some arguable success. The LDC has provided a flexible regime that gives significant latitude to national governments and allows for exceptions even for wastes included in the black list. Its arguable success has been attributed to the fact that it addresses only 10 percent of marine pollution, for which there exist alternatives on land. Undoubtedly, a proposal to ban ocean and land waste disposal, as well as pollution from land-based sources would have been opposed by all countries concerned.

Needless to say, though, the victories and defeats of the LDC regime are not predictive of the success of minimum standards or of other regulatory methods. Minimum standards are clear, specific, basically technological standards for geologic disposal. The minimum standards approach prescribes that waste disposal should be allowed as long as the minimum standards are satisfied. In other words, minimum standards have nothing to do with waste lists, and black, grey and white waste categories. The uniformity and technological nature of standards thus established aspire to entice industry to comply and simplify monitoring and enforcement. The legal formulation of standards also differ. The London dumping regime is centered around a treaty, while the minimum and other appropriate standards are enunciated in an international code. The code format has many advantages. It allows frequent amendments of standards in view of new technological information and progress in implementation. Both the adoption and amendment of an international code are less likely to encounter strong governmental opposi-

⁸⁷ See, e.g., industrial waste dumping that comprises only 10 percent of marine pollution.

⁸⁸ See, e.g., demands to ban radioactive waste dumping.

tion since codes are not binding, and derive their legitimacy from the degree of application in domestic legislation and international transactions.

There are also conceptual differences between the waste trade and waste dumping regimes, with the result that progress in one is not predictive of the failure or success of the other. First, waste trade involves waste transfers to another state that would in most cases dispose, treat, or recycle the wastes within its territory. The London dumping regime attempts to regulate waste dumping in the territorial and the high seas, areas over which states lack or have limited jurisdiction. While states can supervise waste disposal within their jurisdiction, they cannot monitor or enforce international or national legislation on the high seas. Their enforcement authority in the territorial sea is also restricted by the right to innocent passage. Second, waste trade is effectuated by international transactions. The minimum standards approach attempts not merely to regulate land disposal, but to facilitate and encourage environmentally and financially advantageous waste transactions for both importing and exporting countries. The London dumping regime attempts to regulate the act of waste dumping itself, and has no aspirations to influence international waste trade transactions.

However, while not predictive of the success or failure of other regulatory systems, the London dumping regime is indicative of the shortcomings of prohibitions. Russia has admitted that it dumped high-level radioactive wastes in the sea for years in contravention of the explicit prohibition of the LDC.⁸⁹ As emphasized, the LDC has banned sea disposal of high-level radioactive wastes with no exceptions.

2. REGULATING WASTE TRANSFERS

2.1. *The Basel Convention and the IAEA Guidelines*

The Basel Convention⁹⁰ – outcome of an international process that started in the beginning of 1980s⁹¹ – is the global instrument regulating cross-border

⁸⁹ See *supra* note 13, Chapter 1.

⁹⁰ Basel Convention, *supra* note 1, Introduction.

⁹¹ The Basel Convention has been influenced by international developments that have preceded it. In 1984, the OECD published a Recommendation that provided for the exchange of timely and adequate information between exporting and importing countries, and for the reimportation of wastes in the event of illegal transport. See OECD Doc. C(83) 180 (Final), Feb. 1, 1984, reprinted in 23 I.L.M. 214 (1984). A 1986 Recommendation proposed the prior informed consent rule as a prerequisite for waste exports. See OECD Doc. C(86) 64 (Final), June 5, 1986, reprinted in 25 I.L.M. 1010 (1986). In the European Community, Directive 84/31 of 6 December 1984 on the supervision and control within the European Community of the transfrontier shipment of hazardous wastes, OJ L 326/31 as amended by Directive 86/278 of 12 June 1986, OJ L 181/13 prescribed prior notification and informed consent for waste movements within the Community as well as waste imports into and waste exports out of the Community [hereinafter 1984/86 Directive]. The United States-Mexico agreement regarding cross-border waste movements includes the requirement of informed consent. See Agreement

waste shipments. The Basel Convention was initially designed as a framework Convention, but most of its provisions were strengthened during the negotiations under the influence of developing countries.⁹² It was eventually formulated so as to contain specific state obligations. The final version of the Convention underlines the right of developing countries to ban waste imports,⁹³ and outlaws waste transfers between state and non-state parties.⁹⁴

The Convention attempts to regulate waste movements by imposing restrictions because, as emphasized in the preamble, restrictions reduce trans-frontier movements, and provide incentives for sound waste management. The Convention adopts the proximity and self-sufficiency principles,⁹⁵ but does not specify which one prevails in case of mutual exclusion. National proximate facilities, according to the Convention, must provide sound and efficient management. However, technical guidelines defining sound management have yet to be adopted.⁹⁶ The Convention designates that states must ensure that waste movements are allowed only if the exporting state does not have the capacity to deal with its wastes,⁹⁷ or if the exported wastes are to be recycled or recovered in the state of destination.⁹⁸ Any other waste

of Cooperation between the United States of America and the United Mexican States Regarding the Transboundary Movements of Hazardous Wastes and Hazardous Substances, Nov. 12, 1986, reprinted in 26 I.L.M. 25 (1987). The United States-Canada agreement does not include the requirement of informed consent. See Agreement Concerning Transboundary Movements of Hazardous Waste, Oct. 29, 1986, reprinted in 26 I.L.M. 593 (1987).

At the international level, in 1981 UNEP identified transfrontier waste movements as an environmental problem that needs to be addressed globally. See Programme for the Development and Periodic Review of Environmental Law Report of the *Ad Hoc* Meeting of Senior Government Officials Expert in Environmental Law, U.N. Doc. UNEP/GC.IO/S/Add.2 (1981) [hereinafter *Montevideo Programme*]. Based on the Montevideo Programme, UNEP created a working group to develop the principles that should underlie environmentally sound waste management and transfers. See *Cairo Guidelines and Principles for the Environmentally Sound Management of Hazardous Wastes*, U.N. Doc. UNEP/GC 14/17, Annex II (1987). The *Cairo Guidelines* included the requirement of prior informed consent.

⁹² For the negotiations of the Basel Convention, see Library 2, *supra* note 71, Chapter 1. See also UNEP/WG. 180/3 (1987), UNEP/WG. 182/3 (1988), UNEP/WG. 186/3 (1988), UNEP/WG. 189/3 (1989), and UNEP/WG. 190/4 (1989).

⁹³ See Basel Convention, *supra* note 90, Preamble and Art. 4(1)(a) and (13). Article 4(3) proposed by the Group of 77 provides that "[t]he parties consider that illegal traffic in hazardous wastes or other wastes is criminal." See also *Ad Hoc* Working Group of Legal and Technical Experts with a Mandate to Prepare a Global Convention on the Control of Transboundary Movements of Hazardous Waste, 3rd Sess., Agenda Item 6, at 13, UNEP/WG. 189/3 (1988) [hereinafter 189/3].

⁹⁴ Basel Convention, *supra* note 90, Art. 4(5).

⁹⁵ *Id.*, Art. 4(2)(b), (d).

⁹⁶ *Id.*, Art. 4(8).

⁹⁷ According to article 4(9)(a) of the Basel Convention, *supra* note 90, state parties must take the appropriate measures to ensure that "the state of export does not have the technical capacity and the necessary facilities, capacity and *suitable disposal sites* in order to dispose of the wastes in question in an environmentally sound and efficient manner [emphasis added]." The "suitable disposal sites" provision was proposed by Malaysia. See 189/3, *supra* note 93, at 14.

⁹⁸ Basel Convention, *supra* note 90, Art. 4(9)(b).

movements may still be allowed as long as they do not conflict with the goals of the Convention.⁹⁹ This reference to the Convention's goals is circular and leads back to the qualified version of self-sufficiency and proximity principles without any further clarification.

The Convention further establishes the prior notification and informed consent procedure. State parties must prohibit waste exports, unless they receive the prior written consent of the importing state.¹⁰⁰ More specifically, the exporting state or the generator must notify in writing the importing country and the other concerned states.¹⁰¹ The importing state must also respond in writing and consent to, refuse, or require additional information for the waste transfer.¹⁰² The exporting state must not permit waste exportation until the notifier has received the written consent of the importing state, and confirmation from that state of a contractual relationship between the exporter and the disposer specifying that the wastes will be managed soundly.¹⁰³ Every waste movement must be covered by insurance or other financial guarantee as required by the importing or transit states.¹⁰⁴ Transit states must also consent to the waste movement, but they may waive their right to consent.¹⁰⁵ The disposer must, upon receipt of the wastes, notify the exporter and the exporting state about the completion of disposal. If the exporting state does not receive this information in due course, it must notify the importing state.¹⁰⁶

In order to bypass the excessive bureaucracy embedded in the system of prior notification, concerned states may agree to adopt a general notification procedure when wastes possessing the same physical and chemical characteristics are transported to the same destination, and through the same customs offices in the exporting, importing, and transit states.¹⁰⁷ The general notification procedure may last for one year.

Exporting states must take back wastes that cannot be disposed of as agreed even if the importing state has given its consent for the transfer.¹⁰⁸ The exporting state must also repatriate wastes transferred illegally because

⁹⁹ *Id.*, Art. 4(9)(c).

¹⁰⁰ *Id.*, Art. 4(1)(c).

¹⁰¹ *Id.*, Art. 6(1).

¹⁰² *Id.*, Art. 6(2).

¹⁰³ *Id.*, Art. 6(3).

¹⁰⁴ *Id.*, Art. 6(11).

¹⁰⁵ *Id.*, Art. 6(4). The requirement to notify and receive the consent of the transit countries was adopted after the insistence of the developing countries. See *Ad Hoc* Working Group of Legal and Technical Experts with a Mandate to Prepare a Global Convention on the Control of Transboundary Movements of Hazardous Wastes, 2nd Sess., Agenda Item 6, at 5-6, UNEP/WG. 186/3 (June 20, 1988) [hereinafter 186/3].

¹⁰⁶ Basel Convention, *supra* note 90, Art. 6(9).

¹⁰⁷ *Id.*, Art. 6(8).

¹⁰⁸ *Id.*, Art. 8. This provision was also strengthened. In the previous drafts, it was provided that countries have the duty to reimport only "if alternative arrangements to dispose of the wastes in an environmentally sound manner are not found within a reasonable period of time." See, e.g., 189/3, *supra* note 93, at 21.

of the conduct of the exporter.¹⁰⁹ If it is the importer that engages in illegal trafficking, the importing state must undertake the environmentally sound management of the wastes.¹¹⁰ If neither the exporter nor the importer can be held responsible, the states concerned must cooperate in order to ensure that the wastes will be disposed of soundly as soon as possible.¹¹¹ Illegal waste trafficking, according to the Convention, involves waste movements without notification or consent, or with consent obtained through falsification, misrepresentation or fraud.¹¹² It is also illegal to dispose of wastes by violating the Convention or the general principles of international law.¹¹³

Developing countries succeeded in inserting in the Convention¹¹⁴ provisions on information exchange, technology transfers, and financial assistance.¹¹⁵ The Convention provides that states must establish regional or sub-regional centers, funded voluntarily, for training and technology transfers.¹¹⁶ States must also consider the establishment of a fund that will assist them in cases of emergency resulting from transportation and disposal accidents.¹¹⁷ They may also enter into bilateral, multilateral or regional arrangements.¹¹⁸

Liability¹¹⁹ and non-compliance provisions¹²⁰ included in the negotiated drafts have not been incorporated in the final version. Liability issues have been left to be decided later in a protocol.¹²¹ The proposed non-compliance provision was weakened and adopted as a verification procedure.¹²² The role of the Secretariat has also been diluted in the final version of the Convention. The Secretariat is not explicitly involved in technology transfers.¹²³ It assists

¹⁰⁹ Basel Convention, *supra* note 90, Art. 9(2).

¹¹⁰ *Id.*, Art. 9(3).

¹¹¹ *Id.*, Art. 9(4).

¹¹² *Id.*, Art. 9(1)(a)-(d).

¹¹³ *Id.*, Art. 9(1)(e).

¹¹⁴ Environmental Law and Machinery Unit (ELMU), Hazardous Waste: Why Africa Must Act Now 4 (1989).

¹¹⁵ Basel Convention, *supra* note 90, Art. 10.

¹¹⁶ *Id.*, Art. 14(1).

¹¹⁷ *Id.*, Art. 14(2). For the efforts to establish an emergency fund, see An International Fund for Emergency Situations to Minimize Damage from Accidents Arising from the Transboundary Movements of Hazardous Wastes or During the Disposal of those Wastes, Annex, UNEP Doc./CHW. 1/6 (1992).

¹¹⁸ Basel Convention, *supra* note 90, Art. 11.

¹¹⁹ See 189/3, *supra* note 93, at 29-30.

¹²⁰ "Any Contracting Party found not to be in compliance with this Convention shall be treated by other Parties as if it was a non-Party. Mechanisms for determining non-compliance shall be considered and agreed by the Parties and included in an annex to the Convention." *Id.* at 31.

¹²¹ Basel Convention, *supra* 90, Art. 12.

¹²² Under article 19 a state party may inform the Secretariat about a breach of an obligation of another state party. This information must be submitted by the Secretariat to all state parties. It is hoped that dissemination of the information will exert "peer pressure" on the non-complying state to act in conformity with the Convention.

¹²³ Basel Convention, *supra* 90, Art. 16(g). But see 186/3, *supra* note 105, at 21.

in the application of the prior notification procedure upon request.¹²⁴ In fact, a provision that a copy of each notification be sent to the Secretariat was dropped from the final version of the Convention.¹²⁵ The Secretariat may receive notifications only if a state party affected by transboundary waste movements so requests.¹²⁶ It also lacks the explicit authority to establish a list of countries that ban waste imports,¹²⁷ and cannot intervene in dispute settlements.¹²⁸

The purpose of the Basel Convention is to establish state responsibility for hazardous waste transfers. In order to accomplish this goal, the Convention establishes procedural rules – the requirement of prior notification and informed consent – with the hope that they will facilitate the monitoring of waste movements. As mentioned above, the Convention does not specify what constitutes sound waste management and, therefore, it could be interpreted to condone free waste transfers after prior notification and informed consent. For example, the Convention stipulates that states parties must ensure the availability of “adequate” waste facilities located “to the extent possible” within their jurisdiction “whatever the place of disposal.”¹²⁹ It also provides that waste shipments must be “reduced to the minimum consistent with environmentally sound and efficient management.”¹³⁰ This particular enunciation of proximity and self-sufficiency principles and the fact that they could, in practice, be mutually exclusive could effectively thwart a narrow interpretation of the principles.

The technical guidelines, proposed by the first Technical Working Group¹³¹ restate the self-sufficiency, proximity, and least transboundary movement principles.¹³² These principles, however, are tempered again by emphasizing that economically effective and environmentally sound waste management must not be disregarded.¹³³ An expansive interpretation of these qualifications may totally annihilate the principles, thus permitting transfrontier waste movements if economically effective and sound waste management concerns are satisfied. Furthermore, the proposed technical guidelines, without endorsing the minimum standards analyzed in Chapter 1, explicitly allow for land disposal of specific waste categories,¹³⁴ while accentuating

¹²⁴ Basel Convention, *supra* note 90, Art. 16(g). But see 189/3, *supra* note 93, at 39.

¹²⁵ See 189/3, *supra* note 93, at 19.

¹²⁶ Basel Convention, *supra* note 90, Art. 13(4).

¹²⁷ But see 189/3, *supra* note 93, at 32, 39.

¹²⁸ But see *id.* at 43.

¹²⁹ Basel Convention, *supra* note 90, Art. 4(2)(b).

¹³⁰ Basel Convention, *supra* note 90, Art. 4(2)(d).

¹³¹ See Framework Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention, at 4, UNEP Doc./CW.1/20 (1992).

¹³² *Id.* at 8.

¹³³ *Id.*

¹³⁴ The Working Group has issued until now guidelines for waste derived from organic solvents, for waste oils, and for PCB wastes. See *id.* at 23 *et seq.*

that waste minimization, recycling and recovery are preferable waste management methods. An expansive interpretation of the principles on which the Basel Convention is based, in combination with technical guidelines inclusive of land disposal, would render the Basel Convention, a political-pragmatic instrument – a politically acceptable version of free waste transfers after prior notification and informed consent. This is because the effect of the Convention would be diametrically antithetical to the principles embodied in it. The gap between principles and implementation may be deemed an astute device to demonstrate simultaneous allegiance to divergent interests. But the resulting absence of clarity is bound to create a considerable amount of confusion in the regulated community, especially when it is combined with an inadequate waste definition.

Basel's definition of hazardous wastes is incomplete. The Convention leaves the definition of "wastes" to national governments. Thus, it is uncertain whether recyclable wastes are included within the scope of the Convention.¹³⁵ The definition of "hazardous wastes," however, is more comprehensive than domestic definitions. The Convention regulates household waste transfers.¹³⁶ It lists a smaller number of hazardous characteristics than the European Community legislation but more numerous characteristics than the United States regulations.¹³⁷ It does not regulate radioactive waste shipments that are left to IAEA. In 1990, IAEA adopted guidelines for nuclear waste movements "for which no use is foreseen" – not for spent fuel – that require notification and informed consent of the importing country before a nuclear waste transfer.¹³⁸ Since the Basel Convention prescribes the same procedural rule, UNEP and IAEA could have joined efforts to adopt a single instrument for both hazardous and radioactive waste movements. A potential obstacle to such a cooperation are the proximity and self-sufficiency principles, which – even when attenuated with efficiency and effectiveness considerations – are inconceivable for radioactive waste transfers.

¹³⁵ Recyclable wastes are not included within the scope of RCRA. *See infra* note 33, Chapter 5. They are regulated, however, by the European Community. *See* Chapter 6, Section 2.2.

¹³⁶ Basel Convention, *supra* note 90, Annex II. RCRA does not regulate the movements of household wastes. The European Regulation regulates plastics and paper wastes in accordance with the OECD Decision. *See infra* Section 4. *See also* Chapter 6, Section 2.2.1.2.

¹³⁷ For example, it lists infectious, poisonous, toxic and ecotoxic characteristics not listed under RCRA. Compare 40 C.F.R. 261 Subpart C with Annex III of the Basel Convention. Under RCRA hazardous wastes are both those listed by EPA and those containing hazardous characteristics. According to Basel, wastes are considered hazardous, if they contain one of the hazardous characteristics listed in Annex III. The European Community definition is similar to the Basel definition. However, many more hazardous waste characteristics and constituents are included in the European Community Directive. Compare Annexes of the hazardous waste Directive, *infra* note 3, Chapter 6 with Annex I and III of the Basel Convention.

¹³⁸ IAEA: General Conference Resolution on Code of Practice on International Transboundary Movement of Radioactive Waste, reprinted in 30 I.L.M. 556 (1991).

2.2. *The Bamako and Lomé Conventions*

In contrast with the Basel Convention, the Bamako Convention adopted by OAU¹³⁹ incorporates radioactive wastes in the definition of hazardous wastes.¹⁴⁰ It also includes in the hazardous waste definition hazardous substances banned in the state of manufacture.¹⁴¹ Apart from the expansive hazardous waste definition, the Convention follows in the steps of the Basel Convention, but imposes even more stringent restrictions on transfrontier waste movements. It bans all waste imports into the African region, and thus is in harmony with the Lomé Treaty with which the European Community banned waste exports to sixty-eight African, Caribbean and Pacific (ACP) countries.¹⁴² Furthermore waste imports, according to the Bamako Convention, are illegal and a criminal act.¹⁴³ Waste exports, however, are not prohibited. A proposal to ban waste exports to other developing countries was finally rejected during the negotiations of the Convention.¹⁴⁴ The Bamako Convention also prohibits sea dumping and sea incineration.¹⁴⁵

The waste import prohibitions, however, are not accompanied with enforcement and monitoring mechanisms.¹⁴⁶ The Convention does not prescribe a liability regime. It merely provides that state parties must adopt domestic legislation imposing strict, unlimited and joint and several liability

¹³⁹ See Bamako, *supra* note 2, Introduction. The OAU declared in Resolution 1199 that the Basel Convention was insufficient to protect the African countries. It specified that a prohibition of waste shipments to Africa was more appropriate than regulation, and that African countries should agree on a common position to improve the Basel Convention. See OAU Council of Ministers Res. CM/Res. 1199 (XLIX) (June 12, 1989), reprinted in U.N. GAOR, 44th Sess. at 31-32, U.N. Doc. A/44/291 (1989). Resolution 1199 was followed by Resolution 1225 which called for a Pan-African Conference to draft an African Convention that would ban waste movements into Africa. See OAU Council of Ministers Res. CM/Res. 1225 (L) (July 22, 1989), reprinted in U.N. GAOR, 44th Sess. at 62-63, UN Doc. A/44/603 (1989). The working group, which included two members of Greenpeace, met twice before the Bamako Conference and produced a draft Convention that was finally adopted with minor modifications. For the draft of the Convention, see Convention on the Ban on the Import of All Forms of Hazardous Wastes into Africa and the Control of Transboundary Movements of Such Wastes Generated in Africa, reprinted in 20 Environmental Policy and Law (Sept./Oct. 1990). The Bamako Conference was held during the last days of January 1991 and was divided into two parts: the Experts Group that had to prepare the draft Convention and the environmental ministers meeting concerned with the resolutions. But most of the time was spent on the Convention and no resolutions relevant to the Convention were adopted, except for the one that called upon African countries to ratify the Bamako Convention before the Basel. See *supra* note 7, Chapter 1. Many countries have also banned waste imports. See Transnational Management, *supra* note 50, at 5, Chapter 1.

¹⁴⁰ Bamako Convention, *supra* note 139, Art. 2(2).

¹⁴¹ *Id.*, Art. 2(1)(d).

¹⁴² Fourth ACP-EEC Lomé Convention, Dec. 15, 1989, reprinted in 29 I.L.M. 809 (1990).

¹⁴³ Bamako Convention, *supra* note 139, Art. 4(1). See also Resolution on Dumping of Nuclear and Industrial Waste in Africa, OAU Council of Ministers Res. CM/Res. 1153 (XLVIII) (May 23, 1988).

¹⁴⁴ Confidential sources.

¹⁴⁵ Bamako Convention *supra* note 139, Art. 4(2).

¹⁴⁶ *Id.*, Art. 12.

on waste generators.¹⁴⁷ The Bamako Secretariat has not been granted more extensive authority than the Basel Secretariat to oversee and enforce the ban.¹⁴⁸

With respect to waste movements within the African region, the Bamako Convention requires prior notification and informed consent, but dispenses with the general notification procedure provided in the Basel Convention.¹⁴⁹ It also stresses that disposal in the state of origin should be preferred,¹⁵⁰ and that waste movements should be reduced to the minimum.¹⁵¹ But the failure to define “environmentally sound management”¹⁵² and the potential conflict between the notions of proximity and self-sufficiency leave open the possibility of disposal in states other than the state of origin.¹⁵³ The precautionary principle,¹⁵⁴ and the emphasis on clean production methods, which exclude “end-of-pipe” pollution controls of any kind,¹⁵⁵ do not clarify “environmentally sound management” because they are not formulated in a mandatory manner.

The ban and restrictions are certain to contribute to an increase of illegal transfers into Africa or among African countries. This is because of the *static* dimension of wastes in combination with the modest financial resources of African countries that cannot sustain rigorous enforcement of the ban. Africa is still plagued by numerous problems due to underdevelopment, civil wars lingering from the ideological conflicts of the past decades, and the recent threat of the AIDS epidemic. Monitoring international waste transfers, therefore, cannot be a priority for African countries. And this has escaped the attention of the drafters of the Bamako Convention.

The provisions on waste transfers between African countries emphasize unduly the proximity and self-sufficiency principles. A loyal implementation of these principles when they are not mutually exclusive, will artificially isolate African countries, which could benefit immensely from regional facilities capable of receiving the aggregate amount of small waste volumes of individual countries. African countries could also engage in waste trade and exchanges with each other, and generally foster bilateral and multilateral relationships to solve their waste management problems.

Moreover, instead of prohibiting waste imports, African countries could have taken advantage of the urge of the developed world to cheaply dispose of wastes by negotiating appropriate transfers of technology, favorable waste exchanges, or financial aid for the development of regional waste manage-

¹⁴⁷ *Id.*, Art. 4(3)(b).

¹⁴⁸ *Id.*, Art. 16.

¹⁴⁹ *Id.*, Art. 6(6).

¹⁵⁰ *Id.*, Art. 4(3)(d).

¹⁵¹ *Id.*, Art. 4(3)(t).

¹⁵² *Id.*, Art. 4(3)(k).

¹⁵³ *Id.*, Art. 4(3)(d).

¹⁵⁴ *Id.*, Art. 4(3)(f).

¹⁵⁵ *Id.*, Art. 4(3)(g)-(h).

ment facilities. Negotiating favorable waste deals could be characterized as unrealistic, given that companies in developed countries are simply interested in cheap waste disposal. But this is not always accurate. The total lack of waste management options due to fierce public opposition in developed countries has often frustrated waste generators and waste management industries. Waste management in developing countries – especially the most advanced ones, which need to develop domestic infrastructure and capabilities to treat their own wastes – may be the last resort option for companies located in developed countries, before undertaking illegal waste disposal. Therefore, it is quite possible that companies or governments in the first world will be eager to negotiate waste deals which are also favorable to developing countries. This does not mean that certain corporations will not attempt to manipulate the ignorance or needs of developing countries. This is bound to happen to some extent, but it must not be allowed to subvert the general spirit of cooperation and efforts to foster bilateral and multilateral waste trade relationships. This study has proposed that it is preferable to allow waste deals, in order to facilitate supervision and enforcement, than prohibit them altogether and exacerbate illegal waste transfers – the most blatant form of waste mismanagement, and externalization of costs of waste management. In the absence of enforcement and monitoring mechanisms and financial resources, attempts to negotiate advantageous waste deals and stimulation of international waste trade are more realistic options than banning such trade.

3. THE INTERNATIONAL CODES FOR THE TRANSPORT OF DANGEROUS GOODS

In addition to the Bamako, Lomé and Basel treaties, which establish procedural rules for hazardous and radioactive waste movements, there exist other international instruments that concentrate on the technical details of international waste transfers. These instruments are not preoccupied exclusively with the transportation of wastes, but deal generally with the transport of dangerous goods. The technical guidelines of the International Civil Aviation Organization (ICAO),¹⁵⁶ the International Maritime Dangerous Goods (IMDG) Code,¹⁵⁷ the International Regulations Concerning the Carriage of Dangerous Goods by Rail (RID),¹⁵⁸ and the European Agreement Concerning

¹⁵⁶ International Civil Aviation Organization (ICAO), Technical Instructions for the Safe Transport of Dangerous Goods by Air, Doc. 9284-AN/905 (ICAO ed. 1986) [hereinafter ICAO]. The technical guidelines provide specific recommendations in accordance with the broad provisions included in the Safe Transport of Dangerous Goods by Air – Annex 18 to the Convention on International Civil Aviation (ICAO ed. 1989).

¹⁵⁷ See International Governmental Maritime Consultative Organization (IMCO), International Maritime Dangerous Goods Code, IMO (092.1)/D2 (ed. 1981) [hereinafter IMDG]. For a summary of the Code, see S. Mankabady, 1 *The International Maritime Organization* 101–22 (1986) [hereinafter Mankabady].

¹⁵⁸ International Regulations Concerning the Carriage of Dangerous Goods by Rail (RID), reprinted in 1100 U.N.T.S. [hereinafter RID].

the International Carriage of Dangerous Goods by Road (ADR)¹⁵⁹ follow the United Nations (UN) classification system for the transportation of dangerous goods.¹⁶⁰ They classify dangerous goods in nine classes,¹⁶¹ and single out, in accordance with the UN recommendations,¹⁶² certain dangerous substances that are too dangerous for air, road, or rail transport, or for carriage in passenger ships.¹⁶³

The purpose of the UN recommendations is to prescribe a unified international system for the transportation of dangerous goods, and to contribute to the harmonization of national laws.¹⁶⁴ The recommendations, therefore, are flexible and this facilitates their incorporation into national regulations. They also explicitly favor cost-benefit considerations between safety and economic feasibility. They emphasize that safety concerns must not impede the movement of dangerous goods. Separate transportation of certain substances is excluded, for example, as economically infeasible, even if such a measure would improve safety.¹⁶⁵

Besides the classification of dangerous goods, the regulations provide specifications concerning packing,¹⁶⁶ marking,¹⁶⁷ and placarding.¹⁶⁸ There exist general and special packing recommendations,¹⁶⁹ and tests for packag-

¹⁵⁹ UN Doc. ECE/TRANS/80/(Vol. I and II) (including amendments up to January 1990) [hereinafter ADR].

¹⁶⁰ See Recommendations of the Committee of Experts on the Transport of Dangerous Goods, ST/SG/AC.10/1/Rev.3 (UN ed. 1984) [hereinafter UN].

¹⁶¹ These classes are: class 1 – explosives, class 2 – gases, class 3 – inflammable liquids, class 4 – inflammable solids, class 5 – oxidizing substances, class 6 – poisonous(toxic) and infectious substances, class 7 – radioactive substances, class 8 – corrosive substances, class 9 – miscellaneous dangerous substances. See UN, *supra* note 160, at 2–6; ICAO, *supra* note 156, at 2–1–1 – 2–9–1; IMDG, *supra* note 157, volume 1. The UN classification system also provides for the possibility of developing a “generic” or “not otherwise specified” (NOS) entry for substances that do not yet have a specific name. All substances, however, must eventually be classified. See UN, *supra* note 160, at 8; ICAO, *supra* note 156, at 2–11–1. The increased entry of NOS substances in the IMDG has created uncertainty about the exact properties of such substances. See Mankabady, *supra* note 157, at 121.

¹⁶² UN, *supra* note 160, at 7.

¹⁶³ ICAO, *supra* note 156, at 1–2–1; RID, *supra* note 158, at 57; ADR, *supra* note 159, at 5.

¹⁶⁴ UN, *supra* note 160, at 1.

¹⁶⁵ UN, *supra* note 160, at 164.

¹⁶⁶ For the purposes of packing, dangerous goods are divided in three classes: great danger – Packing Group I, medium danger – Packing Group II, and minor danger – Packing Group III. See UN, *supra* note 160, at 209; ICAO, *supra* note 156, at 3–(i). See also IMDG, *supra* note 157, at 0023, 2003.

¹⁶⁷ UN, *supra* note 160, at 385; ICAO, *supra* note 156, at 4–2–1; IMDG, *supra* note 157, at 0017.

¹⁶⁸ UN, *supra* note 160, at 396.

¹⁶⁹ UN, *supra* note 160, at 209–87; ICAO, *supra* note 157, at 3–3–1 – 3–11–5; IMDG general recommendations are contained in first volume and most of the specific recommendations are included in the subsequent volumes; ADR, *supra* note 159, Part II; RID, *supra* note 158, Part II.

ings that evaluate their suitability for the transportation of dangerous goods.¹⁷⁰ The IMDG Code, in particular, includes a glossary and helpful illustrations of most packagings.¹⁷¹ All international regulations also provide description of the labels for the different classes of dangerous goods.¹⁷²

Dangerous goods cannot be transported without appropriate documentation specifying the proper shipping name, the class – whenever a class is assigned – the UN number, and the quantity of goods transported.¹⁷³ If the substances transported are dangerous wastes, the proper shipping name must include the word “waste.”¹⁷⁴ Assigning the right shipping name is especially important. If dangerous goods are not identified properly, emergency response in the case of an accident will be unsuccessful because different dangerous materials may require totally different types of responses.¹⁷⁵

In order to address the concerns expressed in the Basel and Bamako Conventions, the International Maritime Organization (IMO) adopted an amendment to the IMDG Code.¹⁷⁶ The purpose of the amendment is to regulate the transfers of hazardous wastes but not of radioactive wastes, which is peculiar since the IMDG Code regulates the transportation of radioactive materials. The amendment reiterates that waste transfers are illegal if they occur without the prior notification and informed consent of the importing country or without the appropriate documentation.¹⁷⁷ It specifies that packages containing wastes must be marked, labeled and placarded,¹⁷⁸ and that they should be examined carefully before shipment for signs of damage or leakage.¹⁷⁹

The transport of radioactive materials is regulated principally by IAEA.¹⁸⁰ According to the IAEA recommendations, radioactive materials must be “segregated sufficiently from workers and from members of the public,” and

¹⁷⁰ The tests that evaluate the strength of packages are: the drop test, the leakproof test, the internal pressure (hydraulic) and the stacking test. See UN, *supra* note 160, at 229–35; ICAO, *supra* note 156, at 7–4–1 – 7–4–4; ADR, *supra* note 159, Appendix A5; RID, *supra* note 158, at 261, 291; IMDG, *supra* note 157, Annex 1, at 15.

¹⁷¹ IMDG, *supra* note 157, vol. 1, Annex I.

¹⁷² UN, *supra* note 160, at 385–93; ICAO, *supra* note 156, at 4–3–1 – 4–3–15; ADR, *supra* note 159, Appendix A.9; RID, *supra* note 158, at 317.

¹⁷³ UN, *supra* note 160, at 393–94; ICAO, *supra* note 156, at 4–4–1 – 4–4–3; IMDG, *supra* note 157, at 0021–1 – 0021–6; RID, *supra* note 158, at 250.

¹⁷⁴ UN, *supra* note 160, at 394.

¹⁷⁵ UN, *supra* note 160, at 397. See also S. Mankabady, *The International Maritime Organization 103–7* (1984) (referring to cases involving transportation of hazardous materials that led to disasters because of failure to declare the exact nature of the dangerous substance carried).

¹⁷⁶ See Amendment 26–91 to the IMDG Code (IMO ed. 1991).

¹⁷⁷ *Id.* at 0209.

¹⁷⁸ *Id.* at 0210.

¹⁷⁹ *Id.*

¹⁸⁰ See IAEA, *Regulations for the Safe Transport of Radioactive Material* (Safety Series No. 6, ed. 1990) [hereinafter *Safe Transport*]. For the emergency response measures regarding transportation accidents involving radioactive material, see IAEA, *Emergency Response Planning and Preparedness for Transport Accidents Involving Radioactive Material* (Safety Series No. 87, ed. 1988).

the maximum prescribed exposure levels for workers and members of the public must not be exceeded.¹⁸¹ Prescribed activity limits for packaged radioactive material,¹⁸² and specific requirements for the pre-shipment inspection of packages must similarly be followed.¹⁸³ Radioactive material packages must not contain other items except for those that would be used with the radioactive material.¹⁸⁴ Ideally, radioactive material packages must be segregated from other dangerous goods during transportation and storage.¹⁸⁵ The IAEA has also issued recommendations on marking, labeling and placarding as well as the desirable course of action if a package containing radioactive material is leaking.¹⁸⁶ It has emphasized that other dangerous properties of radioactive materials, such as explosiveness, flammability, or chemical toxicity, must be taken into account in all aspects of transportation.¹⁸⁷ The IAEA has also categorized packages – packages for more radioactive materials (type B packages) and packages for less radioactive materials (type A packages) – and has established general requirements for each category.¹⁸⁸ Additionally, packages have to undergo tests that are more stringent than the existing domestic tests.¹⁸⁹

A person who wishes to transport radioactive material (“consignor”) must supply the carrier with a transport document including information on supplementary operational requirements and emergency preparedness, as well as restrictions on the mode of transport.¹⁹⁰ Certain radioactive materials cannot be transported without the prior notification of the transit and destination countries, preferably seven days before the shipment.¹⁹¹ The notification must include: identification of the package, the date of shipment and arrival, the name of radioactive material, description of its chemical form, and the maximum activity of its radioactive contents during transport.¹⁹²

¹⁸¹ *Id.*, Safe Transport, at 14 (for workers the maximum dose level must be 500 mrem per year and for members of the public 100 mrem per year).

¹⁸² *Id.* at 31.

¹⁸³ *Id.* at 33.

¹⁸⁴ *Id.* at 34.

¹⁸⁵ *Id.*

¹⁸⁶ *Id.* at 45–51.

¹⁸⁷ *Id.* at 34.

¹⁸⁸ *Id.* at 61–73.

¹⁸⁹ Compare *id.* at 79–82 with 10 C.F.R. 71.71–71.73 (for example, the United States regulations do not provide additional tests for Type A packages designed for liquids and gases. The mechanical test that consists of three different drop tests is not also included in the United States regulations).

¹⁹⁰ *Id.* at 53.

¹⁹¹ *Id.*

¹⁹² *Id.* 53–54. Before the first radioactive material shipment in a package design requiring approval, the consignor must supply the transit and destination states with the certificate of approval of the package design issued by the country of origin. *Id.* at 83. The destination and transit authorities do not need to acknowledge the receipt of the certificate. *Id.* at 53.

The IAEA has also established standards for radiation protection.¹⁹³ It has adopted the recommendation of the International Commission on Radiological Protection (ICRP) that radiation exposures be kept "as low as reasonably achievable."¹⁹⁴ No source involving exposure of human beings to ionizing radiation will be authorized unless it is subject to control by a system of notification, registration or licensing established by states.¹⁹⁵ Employers are responsible for the protection of their employees from radiation.¹⁹⁶ They must provide adequate radiation protection facilities, services, equipment and manpower.¹⁹⁷ Workers must receive appropriate training. Medical surveillance of workers and records including the results of such surveillance must be kept.¹⁹⁸ In case of an accidental and emergency exposure – exposure exceeding the radiation limits established – the competent authorities should be informed and the workers affected must undergo medical examination. The causes and consequences of abnormal exposures must be fully investigated.¹⁹⁹

The UN and IAEA recommendations have been incorporated with modifications in other international instruments, and have been successful in raising the safety standards for the transportation of dangerous goods.²⁰⁰ An example of the widespread acceptance of the standards is the Convention prescribing liability for the transportation of dangerous goods by rail, road, and inland waterway vessels²⁰¹ which refers, for the identification of dangerous goods, to the ADR list of dangerous substances, because of the wide application of the ADR agreement by European transporters. The United States has also adopted most of the international recommendations for the transport of dangerous goods.²⁰² To satisfy the needs of multimodal transport, however, more coordination of rules adopted by different international organizations is needed.²⁰³

The domestic implementation of standards included in voluntary codes demonstrates that allegiance to international instruments does not necessarily

¹⁹³ The annual dose equivalent limit for workers is 5 rem. The annual dose limit for individual organs and tissues of workers is 50 rem, except for the lens of the eye where the dose equivalent must not exceed 15 rem. The annual dose equivalent limit for members of the public is 0.5 rem. The annual dose limit for the individual organs and tissues of members of the public is 5 rem. See IAEA, *Basic Safety Standards for Radiation Protection* (Safety Series No.9, ed. 1982) [hereinafter *Safety Standards*].

¹⁹⁴ ICRP, *Recommendations of the International Commission on Radiological Protection* 14 (ICRP Publication 26, ed. 1977).

¹⁹⁵ See *Safety Standards*, *supra* note 193, at 3.

¹⁹⁶ *Id.* at 10.

¹⁹⁷ *Id.*

¹⁹⁸ *Id.* at 13–16.

¹⁹⁹ *Id.* at 20–21.

²⁰⁰ See, e.g., Mankabady, *supra* note 157, at 121.

²⁰¹ See *infra* Section 5.2.

²⁰² See Chapter 5, Section 2.

²⁰³ For example, the RID classification of dangerous goods differs from the UN, ICAO, ADR and IMDG classifications of dangerous goods. See RID, *supra* note 158, at 61–252.

hinge upon their obligatory character. Rather, the ability of instruments to facilitate international transactions and simplify international trade is more important. The international code proposed, which includes minimum and other waste management standards, aspires to achieve exactly that: facilitation of environmentally sound waste transactions.

4. OECD: TAKING THE DEGREE OF HAZARD SERIOUSLY

The OECD has also defined wastes for the purposes of transfrontier movements.²⁰⁴ The International Waste Identification Code (IWIC) is comprised of numbers contained in six tables that, when taken together, provide comprehensive characterization of wastes.²⁰⁵ The IWIC is the basis for the regulation of recyclable waste transfers according to a three-tiered system that classifies wastes as green, amber, and red.²⁰⁶

The green category²⁰⁷ includes wastes without hazardous characteristics²⁰⁸ destined for recovery operations.²⁰⁹ Transfrontier movements of those wastes are regulated like other commercial transactions.²¹⁰ Member states, however, have the right to subject green list wastes to more stringent rules.²¹¹

Amber list²¹² waste transfers are significantly restricted and cannot take place without a valid contract, financial guarantees,²¹³ and prior notification and informed consent. If the importing country has not objected to the shipment – within thirty days from the acknowledgement of the receipt of the notification – it is inferred that it has tacitly consented.²¹⁴ Importing countries, however, may decide not to object to waste imports to certain recovery facilities. In that case, they must inform the OECD Secretariat about the identity of

²⁰⁴ OECD Doc. C(88) 90 (Final), May 27, 1988, reprinted in 28 I.L.M. 257 (1989).

²⁰⁵ Table 1 contains codes identifying the reasons why certain materials are considered wastes of which the consignor may select two. Table 2 contains the disposal methods and their assigned codes of which the consignor must select the one that identifies more closely the disposal method for the particular waste. Table 3 contains descriptors of the generic forms of wastes (and their codes) of which the consignor may select one. Table 4 contains different hazardous constituents and their codes of which the consignor may select no more than three. Table 5 contains a list of hazardous waste characteristics and their codes of which the consignor may select no more than two. Table 6 contains a list of activities that generate waste and their codes of which the consignor may select one. The wastes transferred must contain codes from all the six tables. In this manner, their nature and method of treatment will be easily identifiable. *See id.*

²⁰⁶ OECD Council Decision C (92) 39 (Final), adopted on 6th April 1992.

²⁰⁷ Wastes included in the green list are contained in Appendix 3. *See id.*

²⁰⁸ *Id.*, Art. II(7)(iv) and Art. III(2).

²⁰⁹ *Id.*, Art. II(2)(a).

²¹⁰ *Id.*, Art. II(2)(a).

²¹¹ *Id.*, Art. II(6).

²¹² For the amber list wastes, *see id.*, Appendix 4.

²¹³ *Id.*, Art. IV(1).

²¹⁴ *Id.*, Art. IV(2), Case(1).

recovery facilities, and the types of wastes they may accept. Due to this pre-consent procedure, prior consent of the importing country for each individual waste shipment is unnecessary. But importing countries may still review the information contained in the notification and the contract between the notifier and the disposer. For that purpose, both the notification and the contract must be received by the importing country seven days before the shipment.²¹⁵ A tracking document must also accompany all waste movements.²¹⁶ Three days after the receipt of the wastes, the recovery facility must send a signed copy of the tracking document back to the notifier and the concerned states.²¹⁷ Member States may also choose to employ the general notification procedure.²¹⁸ Re-exportation of wastes from the importing country to a third country can only occur after notification of the initial exporting country. The consent of the initial exporting country can be inferred from its failure to raise objections within thirty days from the acknowledgment of the notification.²¹⁹

Red list waste transfers are even more stringently regulated.²²⁰ Importing countries may not pre-consent to such movements, and their failure to object must not be interpreted as tacit consent.²²¹ The Decision further encourages states to cooperate in order to refine the criteria²²² that determine the listing of wastes.

The Decision's purpose is to regulate the international trade in recyclable wastes according to the danger they present. For this reason, the Decision's classification system is analogous with the LDC. The difference is that the OECD Decision regulates waste transactions while the LDC regulates marine dumping activities. The Decision has been criticized by environmental groups as relaxing the controls imposed by the Basel and Bamako Conventions that do not explicitly distinguish between recyclable and non-recyclable wastes. The European Regulation regarding transfrontier waste movements has imposed many more controls on green list wastes because of fears that unscrupulous

²¹⁵ *Id.*, Art. IV(2), Case(2).

²¹⁶ *Id.*, Art. IV(2), Case(1)(i) and Case(2)(f).

²¹⁷ *Id.*, Art. IV(2), Case(1)(j) & Case(2)(f).

²¹⁸ *Id.*, Art. IV(2), Case(1)(k) & Case(2)(f).

²¹⁹ *Id.*, Art. IV(3).

²²⁰ For the red list wastes, *see id.*, Appendix 5.

²²¹ *Id.*, Art. V.

²²² These criteria are included in Annex 2 of the Decision and provide ample latitude to the notifier. The notifier must identify the properties of waste by taking into account the following considerations: the hazardous characteristics of the waste listed in Table 5 of the OECD Council Decision C(88) 90 (Final); whether the waste is typically contaminated; the physical state of waste; the difficulty of clean-up in case of an accident or mismanagement; and the economic value of waste. The notifier must also take into account management considerations: the technological capability to recover the waste; the history of adverse environmental incidents associated with transnational movements or recovery operations; the frequency of international transfers; the method of treatment of the portion of waste that cannot be recycled; and the overall environmental benefits from waste recovery. *See also id.*, Art. VI.

businesses may take advantage of the green list exception, and export wastes for sham recycling.²²³

This study has emphasized the importance of the *dynamic* dimension of wastes for sound waste management.²²⁴ Recyclable wastes are a manifestation of the *dynamic* dimension of wastes. The OECD Decision and particularly the green list exception, the pre-consent and tacit consent requirements are welcomed, therefore, as a desirable alleviation of the bureaucratic requirements imposed by the existing system.

5. INTERNATIONAL PRIVATE LIABILITY REGIMES

5.1. *The Oil Pollution Regime*

The oil pollution regime is the only comprehensive private liability regime in international law, and vividly illustrates the preoccupation of the oil industry with limited liability as the type of liability that will not jeopardize insurance availability. It is essential to mention that the first Conventions dealing with oil pollution were Conventions on limitations of liability. The idea of limiting liability for oil pollution damage preceded the idea of creating a comprehensive regime for oil pollution.²²⁵

The oil pollution regime is comprised of the 1969 Convention on Civil Liability for Oil Pollution Damage²²⁶ and the 1971 Fund Convention.²²⁷ These Conventions have been amended by the 1984 Convention on Civil

²²³ See Chapter 6, Section 2.2.1.2.

²²⁴ Worldwide recycling is worth over \$30 billion annually. See *Recycling Firms Warn Half-Baked Laws Threaten Scrap Metal Trade*, Reuter Library Report, Oct. 30, 1990 (Lexis, Nexis, Omni File).

²²⁵ See, e.g., International Convention for the Unification of Certain Rules Relating to the Limitation of Liability of Owners of Sea-going Vessels, Aug. 25, 1924, reprinted in *International Maritime Conventions* 1383 (Arroyo ed. 1991); International Convention Relating to the Limitation of Liability of Owners of Sea-going Ships, Oct. 10, 1957, reprinted in *International Maritime Conventions* 1389.

²²⁶ Convention on Civil Liability for Oil Pollution Damage, Nov. 29, 1969, reprinted in 973 U.N.T.S. 3, 9 I.L.M. 45. See also Protocol to the 1969 International Convention on Civil Liability for Oil Pollution Damage, Nov. 19, 1976, reprinted in 16 I.L.M. 617 (the purpose of this Protocol was to amend the unit in which limits of liability were expressed. The initial unit was the gold franc and the Protocol has replaced it with SDRs) [hereinafter 1969 Convention].

²²⁷ Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, Dec. 18, 1971, reprinted in *International Conventions on Maritime Law* 236 (1987). See also Protocol to Amend the 1971 International Convention of the Establishment of an International Fund for Compensation for Oil Pollution Damage, Nov. 19, 1976, reprinted in 16 I.L.M. 621 (the purpose of this Protocol was to amend the unit in which limits of liability were expressed. The initial unit was the gold franc and the Protocol has replaced it with SDRs) [hereinafter 1971 Fund].

Liability for Oil Pollution Damage²²⁸ and the 1984 Fund Convention.²²⁹ To be a party to a Fund Convention, a state must be party to the respective Liability Convention. The initial Conventions and their amendments co-exist, and states can be parties to one or both of them at the same time.²³⁰

The oil and tanker industry is anxious to avoid liability under international Conventions, and has accordingly devised voluntary compensation schemes. One such scheme, the Tanker Owners Voluntary Agreement Concerning Liability for Oil Pollution (TOVALOP), provides for strict and limited liability of shipowners just as the Conventions on Civil Liability do. Another scheme, the Contract Regarding an Interim Supplement to Tanker Liability for Oil Pollution (CRISTAL), consists of a fund similar to the funds prescribed by the Fund Conventions.²³¹ By adopting voluntary compensation schemes, the oil industry has hoped to demonstrate to governments that international treaties are unnecessary, or at least influence the emerging international norms for oil pollution.²³²

The 1969 Convention imposes on shipowners strict²³³ and limited liability for oil pollution damage, and joint and several liability when two or more ships are involved and the pollution damage is not reasonably separable.²³⁴ Shipowners can limit their liability by creating a limitation fund.²³⁵ They are not entitled to limited liability, however, if the incident that caused pollution

²²⁸ Protocol of 1984 to Amend the International Convention on Civil Liability for Oil Pollution Damage, May 25, 1984, reprinted in 2 *International Protection of the Environment*, Second Series, II/A/25-05-84a, at 1 (Rüster and Simma eds. 1990) [hereinafter 1984 Convention].

²²⁹ Protocol of 1984 to Amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, May 25, 1984, reprinted in 2 *International Protection of the Environment*, Second Series, II/A/25-05-84, at 21 [hereinafter 1984 Fund].

²³⁰ D.W. Abecassis and R.J. Jarashow, *Oil Pollution from Ships: International*, U.K. and U.S. Law and Practice 246-47 (1985) [hereinafter *Oil Pollution*].

²³¹ *Id.* at 303. ("The two schemes operate together as an integrated whole, but they do not apply to cases actually covered by their respective international legal counterparts: a claimant cannot recover under both the Fund Convention and CRISTAL, for instance, but he can recover under the Liability Convention and CRISTAL if the Fund Convention does not apply to the case."). For more details concerning TOVALOP and CRISTAL, see C. Hill, *Maritime Law* 311-16 (1989) [hereinafter *Maritime*].

²³² *Oil Pollution*, *supra* note 230, at 303.

²³³ According to article III(2) of the 1969 Convention, *supra* note 226, shipowners are exempt from liability in cases of *force majeure*, when pollution damage was caused by a third party with the intent to cause such damage (for example, sabotage), or by negligence or wrongful act of a government or other authority responsible for the maintenance of lights or other navigational aids. The term "navigational aids" is very indeterminate. In an incident involving oil pollution of Swedish territorial waters by a Soviet tanker, the Soviet tanker was able to prove that the pollution was due to a failure to mark a rock on the navigation chart. See *Maritime*, *supra* note 231, at 291.

²³⁴ 1969 Convention, *supra* note 226, Art. IV.

²³⁵ According to article V(1) as amended in 1976, see *supra* note 226, shipowners can limit their liability to an amount of 133 SDRs for each ton of the ship's tonnage. But this amount must not in any event exceed 14 million SDRs.

is the result of their "fault or privity."²³⁶ The concept of "fault or privity" is not further explained. The 1984 Convention has clarified it by providing that shipowners are not entitled to limit their liability, if the pollution damage was the outcome of an intentional act or omission, or of reckless behavior with knowledge that such damage would probably result.²³⁷ Reckless behavior, however, is a flexible concept furnishing courts with latitude in cases they deem fair to impose unlimited liability.

The limitation fund established by the owner is distributed among the claimants in proportion to the amount of their claims. The distribution of claims is a smooth procedure when the total amount claimed does not exceed the limitation fund established by the owner, otherwise it may be delayed.²³⁸

The plaintiff can bring an action for compensation, under the Convention, only in the courts of the state party where the damage occurred.²³⁹ Nevertheless, a plaintiff is still able, under the rules of private international law, to bring an action in the courts of a non-state party if the person responsible for the pollution damage is domiciled within that state.²⁴⁰

The Convention also provides for compulsory insurance of shipowners who carry more than two thousand tons of oil in bulk.²⁴¹ One of the advantages of compulsory insurance is that it drives out of the market businesses with insufficient assets to cover pollution damage. But this effect is tempered because only shipowners carrying two thousand tons of oil are compelled to maintain insurance.²⁴² Enforcement is left to national governments, which have to make sure that the ships they register maintain insurance and carry an insurance certificate on board.²⁴³ Ships without an insurance certificate are

²³⁶ *Id.*, Art. V(2).

²³⁷ 1984 Convention, *supra* note 228, Art. 6(2).

²³⁸ Oil Pollution, *supra* note 230, at 217. The Fund has been involved in sixty cases. In one case, it had not been possible to fully compensate for the damage. Another case where claims may exceed the limit is still pending. See G. Doeker and T. Gehring, Liability for Environmental Damage 30 (Research Paper No. 32, UNCED ed. 1992) [hereinafter UNCED].

²³⁹ 1969 Convention, *supra* note 226, Art. IX. Article VIII also provides that the plaintiff has a right to compensation only if she brings an action within three years from the date when the damage occurred. No action can be brought "after six years from the date of the incident which caused the damage."

²⁴⁰ Oil Pollution, *supra* note 230, at 220-21 ("this has been dramatically illustrated in the *Amoco Cadiz* case off France (a contracting state) in 1978, where French plaintiffs, including the French government, instituted actions in the United States (which was not a contracting state) where the managers of the ship were domiciled. The other defendants included the owner, registered in Liberia (a contracting state) and the ship builder, registered in Spain (also a contracting state). The United States Court of Appeals rejected the plea of *forum non conveniens* made by the ship builder, and the District Court for the Northern District of Illinois proceeded to enter judgment against the owners, managers and their parent company."). See also Maritime, *supra* note 231, at 288. See also Scovazzi, Industrial Accidents and the Veil of Transnational Corporations, in International Responsibility for Environmental Harm 395, 413-21 (Francioni and Scovazzi eds. 1991) [hereinafter Environmental Harm].

²⁴¹ 1969 Convention, *supra* note 226, Art. VII(1).

²⁴² Oil Pollution, *supra* note 230, at 223.

²⁴³ 1969 Convention, *supra* note 226, Art. VII(2) & (4).

not allowed to engage in the business of carrying oil.²⁴⁴ Ships registered in non-state parties are also required to hold such a certificate whenever they enter or leave ports or off-shore terminals of state parties²⁴⁵ so that they do not acquire a competitive advantage over ships of state parties.²⁴⁶ The 1984 Convention further clarifies that state parties should mutually recognize certificates they issue, and that a ship registered in a non-state party can obtain such a certificate from the authorities of any state party.²⁴⁷

The 1969 Liability Convention applies exclusively to pollution damage caused within the territory or the territorial sea.²⁴⁸ Pollution damage is defined as loss or damage caused from the escape or discharge of oil from a ship carrying oil.²⁴⁹ The loss or damage also includes "the costs of preventive measures and further loss or damage caused by preventive measures."²⁵⁰ Preventive measures, in turn, are defined as reasonable measures taken *after* the oil spill has occurred for prevention or minimization of pollution damage.²⁵¹ The definition of oil pollution damage has been criticized as vague because only personal injuries are certain to be covered, and there is no specification for the type and scope of other damages.²⁵²

The 1984 Convention has improved, to some extent, the 1969 definition of oil pollution damage since compensation covers not only personal injuries, but also property damages and loss of profit.²⁵³ Claims for compensation for impairment of the environment are limited to the cost of reasonable measures actually undertaken or to be undertaken to reinstate the environment.²⁵⁴ But the Convention does not provide details on causation or guidance on the quantification of damages such as loss of future earnings.²⁵⁵ The Convention leaves this task to national courts. Yet lack of details on causation and quantification should not be conceived as a shortcoming of the Convention.²⁵⁶ Until national legislation crystallizes, case-by-case adjudication may be more suitable for this task. International conventions have to maintain a certain level of flexibility, otherwise they would be unable to accommodate future developments.

Another innovation of the 1984 Convention is that it establishes liability not only for actual pollution damage, but also for "a grave and imminent

²⁴⁴ *Id.*, Art. VII (10).

²⁴⁵ Art. VII(11).

²⁴⁶ Oil Pollution, *supra* note 230, at 225.

²⁴⁷ 1984 Convention, *supra* note 228, Art. 7.

²⁴⁸ 1969 Convention, *supra* note 226, Art. II.

²⁴⁹ *Id.*, Art. I(6).

²⁵⁰ *Id.*

²⁵¹ *Id.*, Art. I(7).

²⁵² Oil Pollution, *supra* note 230, at 209.

²⁵³ 1984 Convention, *supra* note 228, Art. 2(3). *See also id.* at 237-38.

²⁵⁴ *Id.* at 237-38.

²⁵⁵ *Id.*

²⁵⁶ *But see id.* at 209, 239.

threat of causing such damage.”²⁵⁷ Thus, plaintiffs can now be compensated not only for measures after pollution has occurred, but also for measures taken to avert threats of pollution.

The geographical scope of the 1984 Convention includes the EEZ, the territory and the territorial sea.²⁵⁸ Liability is channelled again to the owner, but other people that perform services for the ship – such as the manager, charterer, or operator of a ship²⁵⁹ – can be held liable if the damage resulted from their intentional act or omission, or their recklessness and they knew that such damage would probably result. As mentioned above, the term “recklessly” provides courts with discretion to hold these persons liable. The Convention does not hold liable the builder or the repairer of the ship.

One of the priorities of the 1984 Convention was to raise the liability limits of the 1969 Convention. The liability ceilings adopted were considered too high, and the final draft of the Convention was only adopted due to the large number of abstentions.²⁶⁰ The revision of liability ceilings does not require a Conference, as was the case with the liability ceilings of the 1969 Convention.²⁶¹ It merely requires a decision by the Legal Committee of the IMO, which is considered accepted within eighteen months after notification to all state parties, unless a quarter of them object.²⁶² The preoccupation with the repercussions of liability on insurance is again evident: state parties will consider the potential increase in insurance costs when contemplating any revision of the liability ceiling.²⁶³

The 1971 Fund Convention supplements the 1969 Liability Convention. Its main purpose is to compensate pollution victims,²⁶⁴ and indemnify the owner held liable under the Liability Convention.²⁶⁵ Indemnification of shipowners was debated at great length during the drafting of the 1971 Convention because of the conflict of interests between states with shipping industries

²⁵⁷ Compare Art. I(8) of the 1969 Convention, *supra* note 226, with Art. 2(4) of the 1984 Convention, *supra* note 228.

²⁵⁸ Compare Art. II of the 1969 Convention, *supra* note 226, with Art. 3 of the 1984 Convention, *supra* note 228.

²⁵⁹ According to article 4(2) of the 1984 Convention, *supra* note 228, these people are: the servants or agents of the owner or the members of the crew, the pilot or any other person who, without being a member of the crew, performs services for the ship; any person performing salvage operations with the consent of the owner or on the instructions of a competent public authority; any person taking preventive measures; and all servants or agents of the persons mentioned above.

²⁶⁰ Oil Pollution, *supra* note 230, at 240–41. According to article 6 of the 1984 Convention, *supra* note 228, shipowners can limit their liability to 3 million SDRs for a ship that does not exceed 5,000 units of tonnage. For a ship with additional tonnage, an additional 420 million SDRs up to a maximum of 59.7 million SDRs are required.

²⁶¹ *Id.*, Art. 15.

²⁶² *Id.*, Art. 15(7).

²⁶³ *Id.*, Art. 15(5).

²⁶⁴ 1971 Fund, *supra* note 227, Art. 4(6) (the amount of compensation can in no case exceed 900 million francs or be lower than 450 million francs).

²⁶⁵ *Id.*, Art. 5(1).

and oil receiving states which finance the Fund.²⁶⁶ In the end, the provision was abolished in the 1984 Fund Convention.²⁶⁷

The 1971 Fund provides compensation for pollution damage²⁶⁸ only if the claimant is unable to obtain full and adequate compensation under the Liability Convention.²⁶⁹ It additionally provides for recovery of preventive costs as defined in the Liability Convention;²⁷⁰ that is, costs incurred from measures undertaken *after* the oil spill. The 1984 Fund Convention further improved this definition by specifying that the claimant is entitled to compensation for preventive measures taken *before* the occurrence of the oil spill.²⁷¹

Under the 1971 Fund Convention, the amount of damages victims are entitled to is unrelated to the amount of indemnification paid to the owner. The provision for distribution of Fund resources among claimants is ambiguous.²⁷² The 1984 Fund Convention²⁷³ has clarified it: claims against the Fund must be distributed *pro rata* disregarding the extent to which they have been satisfied by the limitation fund of the Liability Convention.²⁷⁴ According to the Fund practice, the claims covered are restoration of the environment, loss of livelihood, loss of income, and environmental damage.²⁷⁵ However, claims to recover costs for environmental damage can be made only if economic interests are affected.²⁷⁶

²⁶⁶ Oil Pollution, *supra* note 230, at 261.

²⁶⁷ 1984 Fund, *supra* note 229, Art. 7.

²⁶⁸ Pollution damage is defined in the same fashion in both the 1969 Liability Convention and 1971 Fund Convention. *See id.*, Art. 1(2).

²⁶⁹ *See id.*, Art. 4(1). According to this article, the claimant is considered unable to obtain full and adequate compensation in three cases: when no liability for damage arises under the Liability Convention; when the owner liable under the Liability Convention is financially incapable of meeting her obligations; or when the damage exceeds the owner's limitation fund.

²⁷⁰ *Id.*, Art. 1(2).

²⁷¹ 1984 Fund, *supra* note 229, Art. 2(3). Preventive measures are defined in the same manner in both the 1984 Liability and the 1984 Fund Conventions.

²⁷² 1971 Fund, *supra* note 227, Art. 4(5): "Where the amount of established claims against the Fund exceeds the aggregate amount of compensation payable under paragraph 4, the amount available shall be distributed in such manner that the proportion between any established claim and the amount of compensation actually recovered by the claimant under the Liability Convention shall be the same for all claimants." *See also* Oil Pollution, *supra* note 230, at 270.

²⁷³ The 1984 Fund Convention has also raised the liability limits to 135 million SDRs. Liability limits will be raised to 200 million SDRs in case the states parties to the Convention receive oil equal to 600 million tons. This is because oil receiving states contribute to the Fund. *See* 1984 Fund, *supra* note 229, Art. 6(4)(b)-(c). Thus, in practice the limit will be raised only if the United States together with Japan, or with Italy and France, or with Italy and the Netherlands participate in the Fund. *See* UNCED, *supra* note 238, at 34.

²⁷⁴ Oil Pollution, *supra* note 230, at 269-70, 295.

²⁷⁵ For more details on the exact kind of damages that can be recovered, *see id.* at 274-77.

²⁷⁶ It is difficult to quantify harm to the environment when tangible economic loss or personal injury is not involved. *See* Note by the Director General on Claims Relating to Damage to the Marine Environment, IOPC Fund, Exec. Comm., 30th Sess., Agenda Item 3, FUND/EXC.30/2 (Nov. 29, 1991). *See also* IOPC Fund Resolution No. 3 - Pollution Damage, Annex, FUND/EXC.30/2 (Oct. 1980).

The Fund's settlement procedure is quite remarkable. The Fund has developed a Claims Manual which includes a simple procedure for claim settlement.²⁷⁷ The Fund has a good working relationship with the Protection and Indemnity (P&I) Clubs of shipowners, and claimants can bring their claims just once to either of these two bodies.²⁷⁸ Subsequently, the Club and the Fund divide among themselves the amount paid to the claimant. P&I Clubs are composed of shipowners who are organized together to mutually indemnify each other against lawsuits in cases of damage to cargo or injuries to third parties. The Clubs started to operate in the nineteenth century when underwriters at Lloyd's would cover only three quarters of hull damage.²⁷⁹ Today P&I Clubs cover 90 percent of the world shipping. They provide unlimited coverage in most cases except for oil pollution and nuclear incidents.²⁸⁰ P&I Clubs, usually considered a traditional form of insurance, are one of the oldest types of alternative insurance.²⁸¹

The Fund allows prepayment of damages if the shipowner is entitled to limited liability under the Liability Convention, and undue financial hardship is demonstrated.²⁸² The Fund also makes available credit facilities to state parties "in imminent danger of substantial pollution damage."²⁸³ The 1984 Fund Convention goes even further by not withholding compensation even if the shipowner has delayed the establishment of a limitation fund.²⁸⁴

The Fund is financed by enterprises of oil importing states that receive in the relevant calendar year more than 150,000 metric tons of oil.²⁸⁵ Therefore, a state with modest oil imports can become party to the Fund Convention and enjoy its full protection without imposing on its industry to contribute to the Fund.²⁸⁶ Enforcement is left to states which must ensure that the industry's financial obligations to the Fund are fulfilled, and impose sanctions when necessary.²⁸⁷ The 1984 Fund Convention furthermore prescribes that states can be held liable, if their failure to police the contributors causes financial loss to the Fund.²⁸⁸

In general, the oil pollution regime contains pioneering provisions but it has an important shortcoming: the prescription of limited liability. The inadequacy of liability limits is evidenced by their repeated increases after

²⁷⁷ Oil Pollution, *supra* note 230, at 272.

²⁷⁸ *Id.* at 272-73.

²⁷⁹ B. Farthing, International Shipping 49 (1987).

²⁸⁰ *Id.*

²⁸¹ Brady, High Stakes in the Alternative Market; Non-Traditional Risk-Financing Techniques, Best's Review, Jan. 1992, at 47 (Lexis, Nexis, Omni File).

²⁸² Oil Pollution, *supra* note 230, at 273.

²⁸³ *Id.*

²⁸⁴ 1984 Fund, *supra* note 229, Art. 6(5).

²⁸⁵ 1971 Fund, *supra* note 228, Art. 10(1).

²⁸⁶ Oil Pollution, *supra* note 230, at 279.

²⁸⁷ 1971 Fund, *supra* note 228, Art. 13(2).

²⁸⁸ 1984 Fund, *supra* note 229, Art. 16(2).

environmental disasters.²⁸⁹ After the Amoco Cadiz disaster, France, a state party to the 1974 Convention, refused to collect the money deposited in the limitation fund because of limited liability restraints. France brought, instead, an action in the United States, the domicile of the ship's builder and operator.²⁹⁰

Except for the prescription of limited liability, the oil pollution regime could be a model regime for environmental accidents with international implications.²⁹¹ In particular, the 1984 Civil Liability and Fund Conventions clarify many of the provisions of the Conventions they have amended. They prescribe explicitly compensation for economic loss, and recovery of expenditures for restoration of the environment. They also provide for compensation even when the shipowner limitation fund is not available. Because of these progressive provisions, however, the 1984 Conventions have not yet entered into force. Especially because the United States Congress has refused to ratify them, the prospects of the 1984 Conventions ever entering into force are very slim.²⁹² For this reason, IMO decided to amend the Conventions in a fashion that would ease their ratification.²⁹³

In practice, the 1971 oil pollution regime has functioned smoothly with a swift resolution of most disputes. This is largely due to the fact that oil spills do not directly affect population centers by causing injuries and deaths, but instead have more subtle effects on the marine environment. A liability regime for transnational waste movements can build upon many of the provisions of the oil pollution regime.

5.2. International Liability of the Carriers of Dangerous Goods

The Convention on Civil Liability for Damage Caused During Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels (CRTD)²⁹⁴ was prepared by the UN Economic Commission for Europe (ECE), but all countries can become signatories.²⁹⁵ The Convention imposes strict and lim-

²⁸⁹ UNCED, *supra* note 238, at 37-38 (for example, liability limits were increased by 50 percent after the Amoco Cadiz incident).

²⁹⁰ *In re Oil Spill by the Amoco Cadiz off the Coast of France on March 16, 1978*, 954 F.2d 1279 (7th Cir. 1992).

²⁹¹ The oil pollution regime has also been successful. A significant number of countries have ratified the 1969 Liability Convention and the 1971 Fund Convention.

²⁹² *See supra* note 273.

²⁹³ Consideration of Draft Protocols with Amendments to the Intergovernmental Oil Pollution Liability and Compensation System Based on the 1969 Civil Liability Convention and the 1971 Fund Convention and Related Issues, IMO Leg. Comm., 66th Sess., Agenda Item 9, at 21-24, IMO Doc. LEG 66/9 (Mar. 26, 1992).

²⁹⁴ Economic Commission for Europe, Convention on Civil Liability for Damage Caused During Carriage of Dangerous Goods by Road, Rail or Inland Navigation Vessels (CRTD), Oct. 10, 1989, U.N. Doc. ECE/TRANS/84 (1990), U.N. Sales No.E.II.E.39 (including Explanatory Report) [hereinafter CRTD Convention]. The Convention has not yet come into force.

²⁹⁵ *Id.*, Art. 22.

ited liability on operators of railway lines and persons in control of vehicles carrying dangerous goods.²⁹⁶

In order to facilitate the identification of the liable person, it is presumed that the person in whose name the vehicle is registered is liable. When such registration does not exist, the owner will be held liable, unless she can prove that another person was in control of the vehicle with or without her consent.²⁹⁷

The primary concerns of the drafters of the treaty – to protect potential victims and minimize insurance costs – are recurrent throughout the Convention.²⁹⁸ The possibility of channeling liability to the owner of goods was excluded because ownership may change many times during transportation making identification of the owner burdensome.²⁹⁹ Channeling responsibility to the producer of goods was also excluded because the producer has no control over the carriage. Moreover, the carriage may take place many years after production and, consequently, it would be unfair to require the producer to maintain insurance just in case of some future transportation accident. Moreover dangerous goods are often transported together and it is difficult to distinguish which producer's goods have caused the damage.³⁰⁰ Imposing liability on the shipper was similarly viewed as impractical. The shipper would have to take out insurance for each and every consignment, and it would be cumbersome at the time of an accident to determine which shipper's substance had caused the damage.³⁰¹

Placing liability on the carrier seemed the most practical solution since the carrier is in control of the movement of goods, can be easily identified by the victims, and can take out insurance on an annual basis. Carriers, however, opposed this proposal. They claimed that accidents occur due to the inherent danger of the goods carried, and that imposing liability on the carrier will only increase insurance costs, distort competition, and drive many carriers out of business. The carriers proposed joint responsibility of carriers and shippers. Joint responsibility, however, was rejected because it was considered impractical to place responsibility on the shipper, and because most governments considered joint and several liability too complex. However, recognizing the inequities of placing responsibility on carriers when other persons are also responsible, the Convention renders the consignor or consignee liable for accidents caused during loading or unloading without the carrier's participation. In addition, joint liability is established when both the

²⁹⁶ *Id.*, Art. 1(8). According to article 1(8)(a), when the vehicle carrying dangerous goods is carried on another vehicle the operator of that other vehicle will be considered the carrier. According to article 8, when an incident involving two or more vehicles has caused inseparable damage, both carriers will be held jointly and severally liable.

²⁹⁷ *Id.*, Art. 1(8).

²⁹⁸ *Id.* at 6.

²⁹⁹ *Id.*

³⁰⁰ *Id.*

³⁰¹ *Id.* at 7.

carrier and another person are involved in loading and unloading.³⁰² But for the reasons mentioned above, persons other than the carrier do not have to take out insurance.³⁰³

The issue of whether liability should be limited or unlimited was a source of controversy during the drafting of the treaty. It is interesting to note that a large number of governments argued for unlimited liability, contending that the domestic application of unlimited liability has not harmed the operation of compulsory insurance.³⁰⁴ As a compromise, limited liability was adopted,³⁰⁵ thus, carriers must establish a limitation fund with the court where the lawsuit is brought.³⁰⁶ It was made clear, however, that individual governments may adopt higher limits or unlimited liability.³⁰⁷ Also carriers are not entitled to limited liability when the damage was caused by their intentional or reckless act or omission, or by an intentional or reckless act of their servants and agents.³⁰⁸

The defenses supplied in this Convention are broader than those of the Oil Pollution Convention.³⁰⁹ Carriers will not be held liable in cases of *force majeure*, and if the consignors or other persons failed to inform them about the dangerous nature of goods. The carriers must prove that they did not know, or were not required to know, that the goods carried were dangerous.³¹⁰ Carriers are also exonerated from liability if the damage resulted from an intentional or negligent act or omission of the victim.³¹¹ When the carrier is not liable other persons may be held liable, but many important provisions of the Convention will not apply to those other persons.³¹²

³⁰² *Id.*, Art. 6.

³⁰³ *Id.*, Art. 6(2)(a).

³⁰⁴ *Id.* at 9.

³⁰⁵ For the limits of liability, see *id.*, Art. 9: "The liability of the road carrier and of the rail carrier under this Convention for claims arising from any one incident shall be limited as follows: (a) with respect to claims for loss of life or personal injury: 18 million units of account (b) with respect to any other claim: 12 million units of account. The liability of the carrier by inland navigation vessel under this Convention for claims arising from any one incident shall be limited as follows: (a) with respect to claims for loss of life or personal injury: 8 million units of account (b) with respect to any other claim: 7 million units of account." The reason for imposing lower liability limits on inland navigation carriers was the absence of insurance market for such carriers, and concerns that small such carriers will be unable to insure up to the amounts provided for rail and road carriers. See *id.* at 37.

³⁰⁶ *Id.*, Art. 11.

³⁰⁷ *Id.*, Art. 24.

³⁰⁸ *Id.*, Art. 10.

³⁰⁹ Compare Art. III(2) of 1969 Oil Pollution Convention, *supra* note 226, with Art. 5(4) of CRTD Convention, *supra* note 294.

³¹⁰ See also Art. 22 of Convention on the Contract for the International Carriage of Goods by Road (CMA), May 19, 1956, reprinted in 399 U.N.T.S. 189. According to the CRTD Convention, servants and agents of the carrier are exonerated from liability unless they acted with intent or with knowledge that damage would probably result from their actions. See CRTD Convention, *supra* note 294, Art. 5(7).

³¹¹ CRDT Convention, *supra* note 294, Art. 5(5).

³¹² *Id.*, Art. 7.

Following in the steps of the 1969 Oil Pollution Convention, the CRTD Convention provides for compulsory insurance.³¹³ The insurance covers not only the carrier mentioned in the insurance policy; it also covers any other person in control of the vehicle at the time of an accident.³¹⁴ The participants viewed insurance companies as capable of insuring carriers, and believed that, because of the limited liability, even small carriers would be able to obtain insurance. The insurance companies were in favor of such a regime. They claimed that, while strict liability might initially increase premiums, such an increase would subsequently be reassessed depending on the number and severity of claims.³¹⁵ The monitoring of insurance provisions is left to state parties. Each state party must designate competent authorities that will issue or approve certificates verifying that carriers have obtained insurance.³¹⁶ In order to speed the settlement of disputes, claims for compensation may be brought directly against the insurer. The action against the carrier or its insurer must be brought within three years from the date the victim knew or should have known of the damage and the identity of carrier, or within ten years from the date of the incident.³¹⁷ Actions may be brought in the state party where damage occurred, where the incident took place, or where preventive measures were taken. Another possible forum unavailable in the oil pollution and nuclear liability regimes, is the habitual residence of a carrier, for example, the state of registration of the vehicle of the carrier.³¹⁸ Some states also proposed a fund in case compensation exceeds the liability limits, but the proposal did not gain the support of the majority of governments. It was recognized that the oil importers sponsoring the oil pollution fund were more readily identifiable than industries dealing with dangerous substances.³¹⁹

The definition of dangerous goods is very inclusive.³²⁰ The Convention refers to the ADR which contains extensive lists of dangerous substances and is frequently updated. This ensures that carriers will be knowledgeable about the substances which may entail liability under the Convention. The definition of dangerous goods is also broad enough to include hazardous wastes, at least, until a specific liability regime for hazardous waste transfers is adopted.

The damages covered under the Convention involve loss of life or personal injury and loss of, or damage to property.³²¹ Recovery for pure economic loss is not explicitly covered by the Convention. It should be mentioned, however, that during the drafting many states resisted the explicit exclusion

³¹³ *Id.*, Art. 13.

³¹⁴ *Id.*, Art. 13(2).

³¹⁵ *Id.* at 9.

³¹⁶ *Id.*, Art. 14.

³¹⁷ *Id.*, Art. 18.

³¹⁸ *Id.*, Art. 19.

³¹⁹ *Id.* at 10.

³²⁰ *Id.*, Art. 1(9).

³²¹ *Id.*, Art. 1(9).

of pure economic loss, and maintained that because national laws were still evolving such issues should be addressed in domestic legislation.³²² Loss or damage from polluting the environment is also recovered, although such damage, other than loss of profit, is restricted "to costs of reasonable measures of reinstatement actually undertaken or to be undertaken."³²³ The costs of preventive measures and loss or damage caused by preventive measures may also be recovered.³²⁴ Preventive measures, however, are defined as measures taken after the occurrence of the polluting incident.³²⁵

An advantage of the Convention is that it does not exclude the possibility of application of unlimited liability since it prescribes unlimited liability for reckless carriers and allows for the adoption of more stringent national legislation. But unfortunately, the Convention does not go far enough. Limited liability that could be superseded by expansive judicial interpretation or more stringent domestic legislation fails to bind states to a uniform liability regime. A fund sponsored by consignors or consignees seems also necessary since the aggravation of many accidents is due to the nature of dangerous goods. A fund could be the mechanism of internalization of the transportation costs of dangerous goods.

Yet attempts to impose liability on the shippers of dangerous substances within the framework of the Draft Convention concerning the Carriage of Hazardous and Noxious Substances by Sea³²⁶ have encountered the strong resistance of the chemical industry which claims that liability should lie with the shipowner under the traditional rules of maritime law. Also because of the diversity and number of chemical industries, it is difficult to devise an international body capable of collecting contributions. Recent proposals involve the development of an "International Dangerous Goods Scheme." Under the initial formulation of the Scheme, each shipper and shipowner had to purchase a dangerous goods certificate stating the amount and nature of the cargo, and the trip in which it would be transported.³²⁷ Later in the negotiations, it was decided that only shippers should sponsor the Scheme³²⁸ because that was more in line with the established law and practice initiated

³²² *Id.* at 17-18.

³²³ *Id.*, Art. 1(9)(c).

³²⁴ *Id.*, Art. 1(9)(d).

³²⁵ *Id.*, Art. 1(11).

³²⁶ 1991 Draft Convention on Liability and Compensation in Connection with the Carriage of Hazardous and Noxious Substances by Sea, Jan. 25, 1991, IMO Doc. LEG 64/4 [hereinafter HNS Convention]. The Convention has recently been amended, *see* 1993 Draft International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, Jan. 5, 1993, IMO Doc. LEG 68/4 [hereinafter HNS Revision].

³²⁷ HNS Convention, *supra* note 326, Art. 17.

³²⁸ It has been proposed that the term "scheme" should be replaced by the term "fund." *See* Consideration of a Draft International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, IMO Leg. Comm. 66th Sess., Agenda Item 9, at 9, IMO Doc. LEG. 66/9 (Mar. 26, 1992) [hereinafter 66th Session Report].

by the oil pollution regime.³²⁹ The certificates purchased by shippers will be issued by “issuing agents” – governments³³⁰ – on behalf of the Scheme. Many problems emerged, however, in trying to identify each industrial sector’s contribution,³³¹ because the extent of involvement of each industrial sector in accidents is unknown.³³² The chemical industry has proposed that only shipowners should participate in the Scheme and incorporate the cost of contributing to the Scheme into the freight price. If they fail to contribute, they should be refused registration until they pay.³³³ The proposal of the chemical industry has been rejected.³³⁴

5.3. The Nuclear Liability Regime

The nuclear liability regime is comprised of three Conventions: the OECD-sponsored³³⁵ Paris Convention,³³⁶ the Brussels Convention which supplements it,³³⁷ and the IAEA-sponsored³³⁸ Vienna Convention.³³⁹ Since state parties to the Paris Convention are not parties to the Vienna Convention, and

³²⁹ HNS Revision, *supra* note 326, Art. 17.

³³⁰ Norway has proposed that in addition to issuing agents voluntary “industry associations” should be able to issue HNS certificates. According to Norway’s proposal, the term “industry association” may include worldwide or regional trade sectors, or parts of trade sectors. The members of such associations will have to purchase HNS certificates. The associations will have to contribute to the scheme based on transport statistics, and shippers will have to reimburse their associations according to their membership terms. *See* Consideration of a Draft International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, IMO Leg. Comm. 67th Sess., Agenda Item 9, Annex 2, at 6, IMO Doc. LEG 67/9 (Oct. 13, 1992) [hereinafter 67th Session Report].

³³¹ 66th Session Report, *supra* note 328, Annex 2.

³³² 67th Session Report, *supra* note 330, at 5, 11.

³³³ Consideration of the Draft International Convention of Liability and Compensation for Damage in Connection with the Carriage of Dangerous Goods by Sea, submitted by the European Chemical Industry Council (CEFIC), IMO Legal Comm., 65th Sess., Agenda Item 3, at 2, IMO Doc. LEG. 65/3/8 (Sept. 10, 1991). CEFIC reiterated its position in 67th Session Report, *supra* note 330, at 7.

³³⁴ Report of the Group of Technical Experts on the consideration of a Draft International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea, IMO Leg. Comm. 67th Sess., Agenda Item 3, at 8, IMO Doc. LEG 67/WP. 7 (Oct. 1, 1992).

³³⁵ Convention on Third Party Liability in the Field of Nuclear Energy, July 29, 1960, reprinted in 1041 U.N.T.S. 358 [hereinafter Paris Convention].

³³⁶ Seventeen OECD countries have signed the Convention: Belgium, Denmark, Finland, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Turkey, and the United Kingdom.

³³⁷ Convention Supplementary to the 1960 Convention on Third Party Liability in the Field of Nuclear Energy, Jan. 31, 1963, reprinted in 956 U.N.T.S. 264 [hereinafter Brussels Convention].

³³⁸ Vienna Convention on Civil Liability for Nuclear Damage, May 21, 1963, reprinted in 1063 U.N.T.S. 265 [hereinafter Vienna Convention].

³³⁹ The state parties to the Vienna Convention are: Argentina, Bolivia, Cameroon, Chile, Cuba, Egypt, Hungary, Mexico, Niger, Peru, Philippines, Poland, Trinidad and Tobago and Yugoslavia. Only Argentina and Yugoslavia are, however, nuclear power states.

in order to enhance international cooperation, the Joint Protocol Relating to the Application of the Vienna and Paris Conventions³⁴⁰ provides that a state party to either the Vienna or Paris Convention, when it is a party to the Protocol, can recover damages from a nuclear plant operator located in any state which is party to either Convention.³⁴¹

Both the Paris and the Vienna Conventions impose strict³⁴² and limited liability on the operator of a nuclear installation,³⁴³ and joint and several liability when two or more operators are liable and the damage is not reasonably separable.³⁴⁴ Limited liability was considered preferable because it was protective of the relatively new nuclear energy industry.³⁴⁵ Channelling liability exclusively to the operator avoided the excessive administrative and insurance costs of identifying the liability of the other actors, such as suppliers and transporters.³⁴⁶

The Conventions also impose compulsory insurance on the operators of nuclear facilities. But the specification of the amount, type and terms of such insurance is left to each state party.³⁴⁷ The Conventions, *inter alia*, prescribe liability for damages caused by radioactive waste transportation and disposal.³⁴⁸ Nuclear damage comprises loss of life, personal injury, and

³⁴⁰ Joint Protocol Relating to the Application of the Vienna Convention and the Paris Convention, Sept. 21, 1988, reprinted in 42 Nuclear Law 56 (NEA ed. 1988).

³⁴¹ All these Conventions deal with the peaceful uses of nuclear power. The only Convention that touches on the military uses of nuclear power has never entered into force because of the sensitivity of national security issues. See Convention on the Liability of Operators of Nuclear Ships, May 25, 1962, reprinted in International Conventions on Maritime Law 138. The Convention provides for strict and limited liability of the operators of nuclear ships (arts. 2-3). No other person except for the operator can be held liable (art.2). Operators of warships are also held liable (art. 1(11)).

³⁴² According to article 9 of the Paris Convention, *supra* note 335, and article IV(3) of the Vienna Convention, *supra* note 338, operators are not held liable in cases of *force majeure*.

³⁴³ Paris Convention, *supra* note 335, Arts. 3 & 6. Vienna Convention, *supra* note 338, Arts. IV(1) & II(5).

³⁴⁴ Paris Convention, *supra* note 335, Art. 5(b). Vienna Convention, *supra* note 338, Art. II(3).

³⁴⁵ Pelzer, Concepts of Nuclear Liability Revisited: A Post-Chernobyl Assessment of the Paris and the Vienna Conventions, in Nuclear Energy Law after Chernobyl 97, 99 (Cameron, Hancher and Kühn eds. 1988).

³⁴⁶ *Id.* at 102. For the carriage of nuclear material both Conventions impose liability on the operator who sends and the operator who receives the material. See Art. 4 of the Paris Convention, *supra* note 335, and Art. II of the Vienna Convention, *supra* note 338. See also Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, Dec. 17, 1971, reprinted in International Conventions on Maritime Law 230, reprinted also in 974 U.N.T.S. 255. The purpose of the Maritime Carriage Convention is to make sure that operators of nuclear installations are exclusively liable for damages caused by a nuclear incident during the transport of nuclear material. More specifically, article 2 of the Convention provides that any person who could be held liable, under international or national law applicable to maritime transport, is exonerated from such liability if the operator of a nuclear installation is liable under the Paris or Vienna Convention or national law.

³⁴⁷ Paris Convention, *supra* note 335, Art. 10. Vienna Convention, *supra* note 338, Art. VII.

³⁴⁸ Paris Convention, *supra* note 335, Art. 1(a)(ii), (iv) & (v), and Art. 8. See also Vienna Convention, *supra* note 338, Art. I(g), (h) & (j), and Art. VI(2).

damage to property.³⁴⁹ It does not include economic loss and loss of future earnings unless the courts of the competent state so provide.³⁵⁰ The Brussels Convention prescribes an interesting compensation scheme: a portion of the compensation is paid by the operator's insurance, another by the installation state, and the remaining balance by state parties, according to a special formula based upon the GNP and the nuclear power of the installation state.³⁵¹ Victims can bring claims under the Conventions only in the courts of the state where the nuclear incident occurred.³⁵² Under the general rules of private international law, however, any state suffering damages has jurisdiction over such claims, and plaintiffs can engage in forum shopping.³⁵³

The nuclear liability regime is not as comprehensive as the oil pollution regime. The liability prescribed is limited and the liability ceilings are ridiculously low³⁵⁴ in light of a disaster such as Chernobyl. In addition, unlike the 1984 oil pollution regime, there are no mechanisms to update the liability limits, and to compensate for preventive measures and economic loss. Furthermore, there is no international fund to sponsor immediate or residual relief after a nuclear disaster.³⁵⁵ The ten year time-frame within which plaintiffs can bring an action is not reflective of the long latency periods between radioactive exposure and disease. In other words, the particular nature of nuclear accidents has disconnected the nuclear liability regime from reality. Only lately have there been efforts to update the Conventions, and specifically their liability limits. The revision process involves close cooperation between OECD and IAEA.³⁵⁶

³⁴⁹ Paris Convention, *supra* note 335, Art. 3. Vienna Convention, *supra* note 338, Art. I(k).

³⁵⁰ Paris Convention, *supra* note 335, Art. 11. Vienna Convention, *supra* note 338, Art. VIII.

³⁵¹ Brussels Convention, *supra* note 337, Art. 3.

³⁵² Paris Convention, *supra* note 335, Art. 13. Vienna Convention, *supra* note 338, Art. XI.

³⁵³ Pelzer, *supra* note 345, 103-4.

³⁵⁴ Under article 7 of the Paris Convention, *supra* note 335, the liability ceiling is 15 million European Monetary Agreement Units of Account. National laws can set lower liability ceilings after examining the difficulties operators encounter in obtaining insurance, but in no case can liability limits be less than 5 million European Monetary Agreement Units of Account. Under article 3 of the Brussels Convention, *supra* note 339, the liability ceiling has been increased to 120 million European Monetary Agreement Units of Account. The 1982 protocols to the Paris and Brussels Conventions, which entered into force in 1988, have replaced the unit of account with SDRs. The Vienna Convention does not establish upper liability limits. It just sets a minimum liability ceiling of \$5 million. See Vienna Convention, *supra* note 338, Art. V (1).

³⁵⁵ Paris Convention, *supra* note 335, Art. 8. Vienna Convention, *supra* note 338, Art. VI(1).

³⁵⁶ UNCED, *supra* note 238, at 17.

CHAPTER 3

Hazardous and Radioactive Waste Practices and Models

The purpose of this Chapter is to give a general overview of the current practices, institutional controls, and standards applied to hazardous and radioactive waste management. The review of scientific literature, however, demonstrates that the search for standards is illusionary. Certainly, there exist some standards for every method of waste management. But there are no "waste management standards" mandating one method to the exclusion of others. It is often said that waste management should primarily aim at waste minimization.¹ Then, in order of preference, follow recycling, incineration and land disposal. The problem is that these practices are often competing, and leave to governments and enterprises a great deal of discretion regarding the choice of appropriate policies.

What is not accomplished by legislation, however, is achieved by public opposition. Public opposition, in most countries, has stalled plans to develop a permanent radioactive waste repository, and has made hazardous waste disposal and incineration almost impossible. Such opposition, it is largely believed, contributes to minimization of waste production. Instead of minimizing their wastes, nonetheless, industries have chosen to transfer them to economically disadvantaged or minority communities,² export them to developing countries or illegally dump them. The *static* dimension of wastes has often frustrated policies aimed at waste minimization by leading, instead, to exploitative or illegal disposal.

A policy regarding hazardous and radioactive wastes must relax the strict distinction between them. A review of the scientific literature and existing radioactive waste programs reveals that hazardous waste management and radioactive waste management can benefit from each other. It also has been repeatedly asserted that certain hazardous wastes are more dangerous

¹ For waste minimization, *see* generally H. Freeman, *Hazardous Waste Minimization* (1990) [hereinafter *Minimization*].

² *See, e.g.,* R.D. Bullard, *Dumping in Dixie: Race, Class, and Environmental Quality* (1990).

than radioactive wastes because they do not decay with time. Radioactive wastes, however, because of their initial linkage with nuclear weapons, have been at the center of political controversy that has differentiated them from hazardous wastes. Despite the politics of the issue, the similarities in management demonstrate that hazardous and radioactive wastes must be viewed in an integrated fashion and be subject to similar policies.

1. PRACTICES

1.1. *Geologic Disposal*

An appropriate waste definition is instrumental in sound waste management. If waste generators, transporters and disposers do not know whether the wastes they handle are hazardous they will certainly mismanage them. The problem is that countries have defined hazardous wastes differently.³ This jeopardizes the collection of reliable data on their production and movements. Similarly, there is no universal definition of radioactive wastes. The IAEA has proposed a definition consistent with the definitions of most countries.⁴ Decisions on radioactive waste management, however, are based more on a case-by-case evaluation of specific wastes rather than on official definitions.⁵

Today most hazardous wastes in the United States and in Europe are landfilled. The haphazard landfilling practices of the past have left also numerous abandoned waste disposal sites that require urgent clean-up.⁶ Landfill

³ Special Needs, *supra* note 37, at 5, Chapter 1. See also OECD, Identification of Responsibilities in Hazardous Waste Management 9-10 (1985).

⁴ See G.D. Burholt and A. Martin, The Regulatory Framework for Storage and Disposal of Radioactive Waste in the Member States of the European Community 3 (1988) [hereinafter Regulatory Framework]. The IAEA classifies radioactive wastes in five categories: (1) high-level, long-lived; (2) intermediate-level, long-lived; (3) low-level, long-lived; (4) intermediate-level, short-lived; and (5) low-level, short-lived.

⁵ Belgium classifies radioactive wastes into three categories: low-level, medium-level, and high-level. *Id.* at 44. In Denmark there is no official classification. *Id.* at 49. In former West Germany wastes are classified into three categories: HAW which is essentially spent nuclear fuel; LAW which is low-level radioactive waste; MAW which is neither high-level nor low-level waste. *Id.* at 52. In France wastes are classified according to the methods of disposal. *Id.* at 58. In Italy radioactive wastes are classified according to the identity and concentration of radionuclides rather than the waste form. *Id.* at 69. In Netherlands low- and medium-level wastes are divided in three categories depending on the nuclide type and origin. *Id.* at 77. In Britain wastes are practicably classified as very low-level, low-level, intermediate-level, and high-level. *Id.* at 89-90. In Switzerland wastes are divided into three basic categories: WA, wastes resulting from reprocessing; RA, wastes from nuclear power plants, and MI which are institutional low-level wastes. *Id.* at 108. In Sweden, there is no formal classification of nuclear wastes. "Waste type descriptions" will be used, instead, that would facilitate disposal at the final repository. *Id.* at 115.

⁶ For United States legislation regarding clean-up of hazardous waste sites, see Chapter 5, Section 6.1. For a list of Superfund sites, see 40 C.F.R. 300. In Denmark 1,200 sites requiring action have been identified. See T. Nunno, J. Hyman, P. Spawn, J. Healy, C. Spears and M. Brown, International Technologies for Hazardous Waste Site Cleanup 28 (1990) [hereinafter

disposal,⁷ however, is still practiced because it is considerably less expensive than recycling and waste minimization. Technological and other standards preventing contaminants from reaching the groundwater have also been developed, and have rendered landfill disposal a sounder waste management method. Before constructing a landfill, laboratory and in situ evaluation of the site,⁸ including the climate,⁹ hydrology,¹⁰ geology,¹¹ topography, soil,¹² and impacts of the site on human health, environment, and life of the neighboring

International Technologies]. In former West Germany by the end of 1985, 35,000 suspicious sites had been identified of which 30,000 were abandoned waste sites and 5,000 contaminated waste sites. Fifty percent of the industrial sites were environmentally dangerous. *Id.* at 30. In the Netherlands 1,600 abandoned landfills have been found. The Netherlands is the only European country that has a clean-up program. This program provides that, when the polluter cannot be found, the government pays 90 percent of the clean-up and the localities pay the rest. *Id.* at 35.

⁷ Other methods of land disposal include land treatment (or land farming), deep well injection, and disposal in surface impoundments. Land treatment involves the placement of the wastes on land. There, the wastes are plowed periodically until they naturally degrade because of the microorganisms contained in the soil. Land farming, however, is of limited use because it requires large land areas and mild climatic conditions. It is used more frequently for less hazardous substances, such as oil sludge residues. Also it must not be used until it is verified that the wastes are actually biodegradable through laboratory analysis and field tests. Deep well disposal involves injection of liquid wastes into rock or other geological formations below the groundwater at depths as low as 12,000 feet. Deep well disposal is considered a sound waste management method. Problems have been attributed to the use of improper technology, lack of safety equipment, and incorrect drilling procedures. Because of the danger of contamination of the groundwater this method has been prohibited in most states. Surface impoundments, such as pits, ponds and lagoons can be used for land disposal as well. Low-permeability soils and clay liners may prevent pollution at these facilities. See R.C. Fortuna and D.J. Lennett, *Hazardous Waste Regulation: The New Era 177-78, 185-86* (1987) [hereinafter *Regulation*]. See also GAO, *Hazardous Waste Disposal Methods: Major Problems with Their Use 4-5* (CED-81-21, ed. 1980) [hereinafter *Major Problems*].

⁸ *Id.*, *Regulation*, at 278.

⁹ Special Needs, *supra* note 3, at 481. Rainfall, which is common in the United Kingdom, contributes significantly to the deterioration of landfills. See K.W. Brown, G.B. Evans, Jr. and B.D. Frentrup, *Hazardous Waste Land Treatment 46-82* (1983).

¹⁰ See *Regulation*, *supra* note 7, at 277-78.

¹¹ Under the United States standards, facilities must not be located within sixty-one meters of a fault that has moved in the recent geologic past (40 C.F.R. 264.18(a)). EPA has also provided a list of places that have a history of seismic activity (40 C.F.R. 264, Appendix VI). Also facilities cannot be located on a 100-year floodplain, unless the facility is constructed in a manner that will prevent the washout of wastes (40 C.F.R. 264.18(b)).

¹² Geological evaluation of a landfill includes air photos, geophysical ground survey, examination of the subsurface through boreholes, investigation and testing of soil and rocks, hydrological and geotechnical appraisal. See Egger, *Hazardous Solid Waste Disposal in the Geological Environment*, in *Hazardous Waste Management 64*, at 75-77 (UNIDO ed. 1989) [hereinafter *Management*]. See also *Regulation*, *supra* note 7, at 277 (information is necessary "on the strata below the site, as well as bedrock characteristics and depth." The zones of significant fracturing must also be identified. Identification of groundwater flow paths is also necessary).

communities, is necessary.¹³ Because natural conditions are rarely ideal,¹⁴ though, it is advisable to further isolate landfills with engineered barriers, such as liners,¹⁵ and leak and leachate collection systems that will prevent contamination of the surrounding environment and groundwater.¹⁶ Groundwater protection is a priority consideration in geologic disposal. Wastes must be securely isolated from the groundwater, and the groundwater, as well as the surface water, must be continuously monitored.¹⁷

Landfill infrastructure is also important. Fire, health, safety, and monitoring¹⁸ regulations must be followed.¹⁹ Water, drainage, telephone, security fencing, emergency planning, and access to quality roads must be available at every landfill.²⁰ Representative sampling of the wastes received,²¹ and records of the vehicles that enter and leave the landfill must always be retained.²² Waste disposers must additionally have plans for the closure and post-closure periods in order to prevent future groundwater contamination.²³

¹³ Special Needs, *supra* note 3, at 457. Because the life of a landfill may be more than 100 years, exploitable resources, population growth, and recreation areas must be taken into account. *See* Management, *supra* note 12, at 75. Aesthetics are also important. Planting trees, for example, around a site can enhance its acceptability. M. Sitting, *Landfill Disposal of Hazardous Wastes and Sludges* 253 (1979).

¹⁴ The lack of an ideal natural environment has led certain authors to compare suitable landfill sites to geological resources, such as ore deposits and oil fields. *See* Schmalz, *supra* note 57, Chapter 1.

¹⁵ Artificial liners, however, are not necessary if landfills are endowed with clay soils. Lining can be very complex and should be entrusted to responsible enterprises. The liners must be compatible with the wastes, and the areas to be lined must be dry and free of objects. *See* Special Needs, *supra* note 3, at 488–99.

¹⁶ Water infiltration into a landfill in combination with biochemical and chemical breakdown of the wastes produces a liquid called “leachate” that may pollute the groundwater. *Id.* at 469.

¹⁷ *Id.* at 443–44.

¹⁸ Under the United States regulations, a security system must be established to prevent the unauthorized entry of people and livestock. This can take the form of 24-hour surveillance (40 C.F.R. 264.14). Frequent inspections are also necessary especially in areas subject to spills, such as loading and unloading areas (40 C.F.R. 264.15).

¹⁹ Special Needs, *supra* note 3, at 483.

²⁰ *Id.* at 483, 487. For the United States regulations, *see* 40 C.F.R. 264.30–264.37. Under the United States regulations, the contingency plan must include a list of the emergency facilities and equipment, and an evacuation plan. The contingency plan must also designate a person as an emergency coordinator. *See* 40 C.F.R. 264.50–264.56.

²¹ Representative sampling, however, is difficult when the waste is not homogeneous. In this case, sampling must be designed in a way that the anomalies of the waste are discovered. Special Needs, *supra* note 3, at 237.

²² *Id.* at 487. According to the United States regulations, the owner or operator of the disposal facility must keep records of the types and quantities of the wastes received, the location of each hazardous waste within the facility, the results of waste analyses, the incidents requiring implementation of the contingency plan, and the results of all the inspections. *See* 40 C.F.R. 264.73.

²³ When the landfill is closed, it must be sealed by an impermeable layer. The post-closure period involves maintenance of the final cover and of the leak and leachate collection systems. *See* Special Needs, *supra* note 3, at 541–42.

Waste isolation from the surrounding environment and aquifers is also at the core of radioactive waste management. The IAEA and most countries have espoused geologic disposal as the final step in radioactive waste management. Geologic disposal is based on the multibarrier concept which mandates that the long-term safety of radioactive wastes depends upon the performance of the components of whole disposal system which includes the site, the repository, and the waste package.²⁴ If one of these components cannot meet the international safety standards, the other two should complement it, and effectively isolate wastes from the surrounding environment.²⁵ In reality, however, engineered barriers have not been as reliable as geological barriers.²⁶ This is one of the reasons why the search for a perfect geological repository has been such an agonizing experience in many countries.

Other important parameters for sound radioactive waste management include compatibility between the wastes, the repository, and the package,²⁷ treatment of corrosive materials, restrictions on liquids, organic and combustible materials disposed of, and exclusion from the disposal facility of explosive materials.²⁸ Waste packages must also be labeled.²⁹ The toxic property of radioactive wastes must be accorded particular attention since toxic substances do not have finite half-lives.³⁰ Waste management programs also frequently emphasize that hazardous waste management can benefit substantially from the progress in radioactive waste management.³¹

²⁴ IAEA, *Acceptance Criteria for Disposal of Radioactive Wastes in Shallow Ground and Rock Cavities* (Safety Series No. 71, ed. 1985) [hereinafter Series 71]. See also IAEA, *Safety Principles and Technical Criteria for the Underground Disposal of High-Level Radioactive Wastes* (Safety Series No. 99, ed. 1989) [hereinafter Series 99].

²⁵ IAEA has proposed guidelines for the performance assessment of underground radioactive waste repositories. See IAEA, *Performance Assessment for Underground Radioactive Disposal Systems* (Safety Series No. 68, ed. 1985).

²⁶ In general, above-ground facilities have proven incapable of containing radioactive wastes. "Reinforced concrete vaults constructed by the Atomic Energy Commission at Eniwetok Atoll in the early 1950's to contain radioactive waste were broken open and emptied by chemical corrosion and wave action less than fifteen years later." The same is true for the "vastly more sophisticated double-walled concrete and steel tanks erected at Hanford." The wastes "leaked repeatedly since 1958" causing the dispersal of 500,000 gallons of high-level and extremely toxic wastes. See Schmalz, *supra* note 14, at 126.

²⁷ Series 99, *supra* note 24, at 13. Series 71, *supra* note 24, at 5.

²⁸ Series 71, *supra* note 24, at 24-30. For the relevant United States regulations, see 10 C.F.R. 60.135(b)-(c).

²⁹ Series 71, *supra* note 24, at 31.

³⁰ *Id.* at 33. It is emphasized that "[i]n an evaluation of the chemical toxicity a distinction should be made between degradable and non-degradable toxic chemicals. Degradable toxic chemicals can be treated in a fashion similar to the treatment of radioactive materials, but for non-degradable toxic chemicals further special restrictions of the quantities to be deposited may have to be made at the time of disposal." See IAEA, *Shallow Ground Disposal of Radioactive Wastes* 15 (Safety Series No. 53, ed. 1981) [hereinafter Series 53].

³¹ One of the goals of the Community radioactive waste program is to evaluate the applicability of research on radioactive waste management to hazardous wastes. See Proposal for a Council Decision Adopting a Specific Research and Technical Development Programme for the European Atomic Community in the Field of Management of Radioactive Wastes (1990-

As was the case with hazardous wastes, in order to select the appropriate radioactive waste site, the geology, hydrology, climate and topography must be examined and evaluated both in the laboratory and in situ.³² Socio-economic conditions of the communities living around the site must not be ignored, and post-operational surveillance of low-level wastes is necessary.³³ Monitoring of high-level radioactive wastes may extend to one hundred years after disposal in order to allow for retrieval in case of malfunctions.³⁴ But the long-term safety of the disposal system must not depend on such monitoring.³⁵ High-level wastes must eventually be isolated so that future generations will not have to maintain the integrity of the disposal system.

In order to identify the "perfect" nuclear waste disposal site, countries have experimented with clay, rock salt and crystalline rock. The IAEA has proposed that the Scandinavian countries would be an ideal location for an international high-level waste repository because of their crystalline rocks – which are the best type of rocks for permanent disposal.³⁶ Other proposed options include marine disposal, and onsite solidification and disposal.³⁷ Sending wastes out to space to be incinerated by the sun is not under consideration because of the high costs involved.³⁸ As we have seen also, marine dumping of high- and low-level wastes has ceased notwithstanding the absence of scientific evidence demonstrating the unsoundness of the practice.³⁹ Radioactive waste disposal in above-the-ground facilities is advocated by public-interest groups. Given the obvious failures of human-made facilities,⁴⁰ however, environmental groups' intention is to render above-ground radioactive waste facilities a constant, visible reminder of nuclear energy's irremediable shortcomings.

94), COM(89) 226 (final). See also Meyer, *The Monitoring of Hazardous Waste Repositories and the Prediction of Contaminant Distribution, in Management*, *supra* note 12, at 79, 79–80. See also Hunter, *Vienna Conclave Focuses on Toxic-Waste Disposal*, *Chemical Engineering*, April 27, 1987, at 17 (Lexis, Nexis, Omni File).

³² Series 71, *supra* note 24, at 5. See also IAEA, *Underground Disposal of Radioactive Wastes 27* (Safety Series No. 54, ed. 1984) [hereinafter Series 54]. See also Series 99, *supra* note 24, at 16 ("Models to be used must be validated as far as possible against evidence from laboratory tests and field observations including natural analogues and site investigations whenever practicable."). For the United States regulations, see 10 C.F.R. 61.50.

³³ E.L. Gershey, R.C. Klein, E. Party and A. Wilkerson, *Low-Level Radioactive Waste 67* (1990) [hereinafter Low-Level]. See also Series 71, *supra* note 24, at 5–6.

³⁴ A. Blowers, D. Lowry and B.D. Solomon, *The International Politics of Nuclear Waste 319* (1991) [hereinafter International Politics].

³⁵ Series 99, *supra* note 24, at 7.

³⁶ International Politics, *supra* note 34, at 322. The best rocks for disposing of high-level wastes are crystalline rocks found in Canada, USSR and most of the Scandinavian countries. Poor geological areas include Italy, France, Switzerland, Japan, South Korea and Taiwan. See *id.* at 281–82.

³⁷ M. Eisenbud, *Environmental Radioactivity 256* (1987) [hereinafter *Environmental Radioactivity*].

³⁸ *Id.* at 256.

³⁹ *Id.* at 248–49, 257.

⁴⁰ See *supra* note 26.

An alternative to underground disposal, for low-level radioactive wastes, is shallow land burial.⁴¹ Shallow land burial involves the placement of solid or solidified wastes near the surface, at depths not exceeding a few tens of meters.⁴² This method has been widely practiced, but it has caused environmental contamination.⁴³ The contamination has not been attributed to the method itself, but rather to the operational and siting practices that have accompanied it.⁴⁴ For this method to be effective, wastes have to be segregated according to their physical and radioactive characteristics, and "properly packaged and placed, not simply dumped."⁴⁵ The burial sites must be located in well-drained systems in order to avoid water infiltration that damages the integrity of the drums, and precipitates the migration of radionuclides.⁴⁶ Post-operational monitoring,⁴⁷ and appropriate facility infrastructure are also important.⁴⁸ Unfortunately, in the past, these were not the prevailing practices.⁴⁹ Consequently, despite official assertions that shallow land burial is a sound waste management method if properly applied, the public still distrusts it. Most states in the United States have opted for highly

⁴¹ Low-level radioactive wastes include: industrial wastes, for example, wastes from companies that produce smoke detectors or self-illuminated devices, and institutional wastes coming from generators, such as universities, nonprofit research organizations, hospitals and medical clinics. Usually low-level radioactive wastes include slightly contaminated paper, scrap metal and building materials. See Low-Level, *supra* note 33, at 24-25. The IAEA has specified that shallow land burial is a suitable method to dispose of intermediate level, short-lived and low-level, short-lived wastes. See Series 71, *supra* note 24, at 4.

⁴² Series 71, *supra* note 24, at 6.

⁴³ See *infra* note 49. The countries that have practiced such disposal are France, the United States, and Russia (former USSR).

⁴⁴ For a detailed description of the concrete steps that must be taken during the designation, operation and post-operation period of a shallow land burial site, see IAEA, Operational Experience in Shallow Ground Disposal of Radioactive Wastes 13-29 (Technical Reports Series No. 253, ed. 1985) [hereinafter Series 253].

⁴⁵ Low-Level, *supra* note 33, at 67. According to the United States regulations, wastes must be placed in the trenches in a manner that maintains the integrity of the package. Void spaces between the packages must be filled with earth and other material to reduce subsidence. See 10 C.F.R. 61.52.

⁴⁶ See Low-Level, *supra* note 33, at 67. "The hydrogeological characteristics of the site are usually the main factors controlling radionuclide migration, since water is the most likely medium for off-site transport of radionuclides." See Series 53, *supra* note 30, at 2.

⁴⁷ Low-Level, *supra* note 33, at 67.

⁴⁸ Facility infrastructure includes, as is the case with hazardous waste, emergency planning, fire fighting capacity, storage and laboratory facilities, and access roads facilitating the movement of wastes and equipment. See Series 53, *supra* note 30, at 21.

⁴⁹ See Low-Level, *supra* note 33, at 49-60 (in the case of Maxey Flats site in Kentucky, for example, major problems resulted from the low permeability of the shale and till at the site which led to accumulation of water in the trenches. Drums in wet trenches were subject to corrosion. Waste management practices worsened the situation: containers of liquid wastes were accepted at the site and packages of solid wastes were dumped at random. Many packages were also damaged during emplacement. Today Maxey Flats is one of EPA's Superfund sites).

engineered facilities⁵⁰ and other countries, like Britain, have decided not to practice shallow land burial anymore.⁵¹

Disposal in rock cavities has been considered an acceptable disposal method for all radioactive wastes except for high-level. This method involves the placement of solid or solidified low- and intermediate-level wastes in cavities which are natural, artificial, or specially excavated for waste disposal.⁵² Rock cavities may represent an excellent disposal method depending on the integrity of the local geology. However, if the rock formation is fractured, radionuclides will rapidly migrate.⁵³

⁵⁰ These facilities include Below-Ground Vaults (BGV), Above-Ground Vaults (AGV), Earth-Mounted Concrete Bunkers (EMCB) or Tumuli, and Shaft Disposal (SD). For a description of these facilities, see Low-Level, *supra* note 33, at 106–10. For a comparison between these facilities and shallow land burial, see *id.* at 113. The authors claim that shallow land burial is a more desirable method than highly engineered facilities not only because it is less costly, but also because “whereas the behavior of geological formations over the next 1000 years can be predicted, we lack data and experience to make the same predictions about concrete.” *Id.*

⁵¹ In the United Kingdom public opposition ended shallow land burial of low-level radioactive wastes in 1987. See International Politics, *supra* note 34, at 183. However, very low-level radioactive wastes are still buried in landfills. See Regulatory Framework, *supra* note 4, at 95. Currently, low-level radioactive wastes are disposed of at Drigg, not in shallow-land burial sites, but in concrete lined vaults. The long-term plans are to dispose of low- and intermediate-level wastes in an underground repository, the construction of which has been repeatedly postponed. See Payne, Waste Management '91, Nuclear News, April 1991, at 96 (Lexis, Nexis, Omni File); Highfield, Waste Dump at Sellafield Postponed, The Daily Telegraph, Sept. 30, 1992, at 5 (Lexis, Nexis, Omni File); Wilkie, Nuclear Waste, The Independent, Sept. 27, 1992, at 9 (Lexis, Nexis, Omni File).

In France low-level radioactive wastes are disposed of in engineered trenches at the Centre de la Manche. Because La Manche's capacity will soon be exhausted, there are plans for waste disposal in a much larger site southeast of Paris. See Dawkins, Loud Rumbblings from Beneath the Surface, Financial Times, Dec. 5, 1990, at I37 (Lexis, Nexis, Omni File); Regulatory Framework, *supra* note 4, at 11; International Politics, *supra* note 34, at 295; Roquelle, Handling Nukes the French Way; Outrage, Debate, Consensus, WorldPaper, Mar. 1993, at 5 (Lexis, Nexis, Omni File).

In Sweden a repository (SFR) for the permanent disposal of low- and intermediate-level wastes has been built, but has not yet started operations. Its design has attracted positive international attention and public opposition at home, International Politics, *supra* note 34, at 283.

Switzerland plans to designate a site for the disposal of low- and intermediate-level wastes by 1995. See Regulatory Framework, *supra* note 4, at 113; MacLachlan and Pilarski, Groups in Western Europe Looking at the Idea of Regional Waste, NuclearFuel, Sept. 28, 1992, at 3 (Lexis, Nexis, Omni File).

In Germany, Konrad has been designated as the repository for low-level radioactive wastes. Currently, low-level radioactive wastes are disposed of in the Asse II Salt Mine which has never been registered as a disposal facility. Asse II has been licensed under the mining and radiation protection laws, and not under the Atomic law that establishes much more stringent standards for waste disposal. In this fashion, low-level radioactive waste disposal has escaped the political debate. See International Politics, *supra* note 34, at 256. See also Berkhout, Radioactive Waste: Politics and Technology 69 (1991) [hereinafter Politics and Technology]. For the disposal of low-level radioactive wastes in the United States, see Chapter 5, Section 5.

⁵² Series 71, *supra* note 24, at 7.

⁵³ See Low-Level, *supra* note 33, at 110.

1.2. Marine Disposal

The public opposition to geologic disposal and the shortage of land facilities have increased the attraction of marine waste disposal. There are no standards for marine disposal in the sense of technological and performance standards for land disposal and incineration. While it is often stated that some pretreatment of wastes ending up in the sea is desirable,⁵⁴ marine disposal relies primarily on the diluting capacity of the oceans.⁵⁵

Marine waste disposal has been practiced widely and its origins can be traced back to the time when ports were centers of population and industry.⁵⁶ The urban wastes – basically sewage sludge – and industrial wastes produced were discharged untreated into estuaries, and then into the sea.⁵⁷ Today marine pollution takes various forms: pesticides and fertilizers contained in river inputs, hazardous substances spilled from shipping accidents, offshore inputs like dredging spoil, and atmospheric inputs.⁵⁸ Land-based and atmospheric sources constitute 77 percent of marine pollution. Intentional waste dumping from ships and off-shore installations comprises only 10 percent.⁵⁹

The effects of toxic and radioactive substances on the marine environment have not yet been sufficiently identified. Traditional toxicological approaches are considered inadequate because of the notable differences between marine and other waters.⁶⁰ In fact, it has been suggested that traditional scientific studies on the effects of pollutants must be rejected for the purposes of marine pollution.⁶¹ Sublethal toxicity testing also, while promising, presents tremendous difficulties.⁶² In addition, it is extremely complex to decipher whether a change in the physiological condition of marine organisms is due

⁵⁴ R.B. Clark, *Marine Pollution* 18 (Oxford ed. 1989) [hereinafter *Marine*].

⁵⁵ *Id.* at 12.

⁵⁶ *Id.* at 4.

⁵⁷ *Id.* at 5.

⁵⁸ *Id.* at 6. Atmospheric inputs involve discharges to the atmosphere that are returned to the land or sea in the form of rain or particulate. *Id.* at 6.

⁵⁹ Pollution from vessels during their normal operations constitutes only 12 percent of the marine pollution. See *The State of Marine Environment*, at 88, Rep. Stud. GESAMP No. 39 (1990).

⁶⁰ See P.D. Abel, *Approaches to Measuring the Toxicity of Pollutants to Marine Organisms*, in *Ecotoxicology and the Marine Environment* 19, at 21 (1991) [hereinafter *Ecotoxicology*].

⁶¹ *Id.* at 23.

⁶² One difficulty is of technical nature and concerns the maintenance of living organisms in the laboratory for long periods. It is difficult to sustain experimental conditions for long periods of time. Another difficulty concerns the identification of normal and abnormal organisms. Many times it is difficult to define "normal" and, consequently, it is difficult to identify "abnormal." *Id.* at 26-27.

to natural causes⁶³ or pollution.⁶⁴ In the latter case, it is hard to identify whether such a change is harmful or part of an adjustment process.⁶⁵ General studies on aquatic environments have revealed that seriously polluted rivers do not have exceptional disease problems and that cancerous lesions are encountered only in severely polluted waters.⁶⁶ There also seems to exist a consensus that the "sewer and dirty harbor syndrome" should not lead to assumptions that the seas and other waters are full of cancerous fish.⁶⁷ It has been contended that even if a contaminant is harmful to a specific marine organism it does not necessarily follow that it will be damaging to the marine environment as a whole.⁶⁸ From a biological point of view, the death of some plants and animals is of limited or no importance as long as the balance of the ecosystem is not adversely affected.⁶⁹

Except for marginal incidents of contamination of coastal populations which consume large amounts of seafood,⁷⁰ the effect of pollution on humans through the food chain has yet to be identified. But the overall risk is estimated to be less than the perceived risk.⁷¹ It is frequently emphasized that carcinogenesis is due more to the potency of a chemical rather than its presence.⁷² It is also emphasized that seafood like any other food contains both carcinogens

⁶³ See Marine, *supra* note 54, at 201. ("It is now becoming clear that there are very wide population fluctuations in marine ecosystems from purely natural causes Not only is it extremely difficult to distinguish pollution-induced change against this fluctuating background, but sometimes the natural fluctuations are sufficient to produce a major ecological change comparable to that resulting from what would be regarded as a catastrophic pollution incident.").

⁶⁴ Bulognesi, Carcinogenic and Mutagenic Effects of Pollutants in Marine Organisms: A Review, in Carcinogenic, Mutagenic and Teratogenic Marine Pollutants: Impact on Human Health and the Environment 67, at 71-72 (Published on behalf of WHO & UNEP eds. 1990) [hereinafter WHO & UNEP] (while correlations have been found between prevalence of neoplasms and pollution, there are studies maintaining that viruses or parasites in combination with genetic factors are to blame for the development of tumors in marine animals. Viruses, parasites and genetic factors may work synergistically with pollutants).

⁶⁵ See also Axiak, Sublethal Toxicity Tests: Physiological Responses, in Ecotoxicology, *supra* note 60, at 132, 134.

⁶⁶ Payne and Rahimtula, Monitoring for Mutagens and Carcinogens in the Aquatic Environment, in WHO & UNEP, *supra* note 64, at 227, 238.

⁶⁷ Bulognesi, *supra* note 64, at 93. See also Marine, *supra* note 54, at 205. ("Even the worst pollution damage is no greater than, and often not much different from, ecosystem changes caused by natural events. A pollution-induced change is avoidable whereas a natural one is not, but fears that pollution is causing irreversible damage or that life in the seas is being destroyed appear to be exaggerated.").

⁶⁸ Marine, *supra* note 54, at 7.

⁶⁹ *Id.*

⁷⁰ The Minamata disease in Japan was caused by the consumption of seafood contaminated with mercury. See *id.* at 91. Cadmium has arguably been associated with an outbreak of itai-itai in a Japanese village. See *id.* at 94.

⁷¹ See *id.* at 94, 99, 103, 129, 192.

⁷² DeFlora *et al.*, Genotoxicity, Biotransformations and Interactions of Marine Pollutants as Related to Genetic and Carcinogenic Hazards, in UNEP/WHO, *supra* note 64, at 3, 26.

and anticarcinogens, and that mechanisms of the human organism can limit the damaging capacity of carcinogens.⁷³

The effects of pollution also depend on the specific characteristics of different marine environments. The North Sea, for example, is heavily used for shipping as well as gravel, sand and oil extraction. The North Sea also receives large amounts of pollution from major rivers and urban populations.⁷⁴ However, it is still a major fisheries ground that is less adversely affected by pollution than by commercial fishing and dredging.⁷⁵ The Mediterranean sea, on the other hand, is much more threatened by pollution because of the restricted water exchange.⁷⁶ The quantities of untreated sewage discharged into it could also cause gastric disorders, hepatic and enteric diseases.⁷⁷ The Baltic sea demonstrates signs of eutrophication because it receives vast amounts of treated and untreated sewage and other organic wastes.⁷⁸ But the metal contamination of fish seems to have fallen lately to more acceptable levels.⁷⁹

1.3. Treatment

Both geologic and marine disposal must be frequently accompanied by treatment. Treatment can be accomplished either at specialized facilities or at the place of waste generation. Onsite treatment may be facilitated by transportable treatment units. The advantages of these units, from a business viewpoint, is that they dispense with the costs and risks of transportation, and the need for permanent facilities. Thus, they render wastes less visible.⁸⁰ A detailed laboratory evaluation of each specific waste must be taken into account for the selection of appropriate treatment.⁸¹ Methods of hazardous waste treatment include physical, chemical and biological treatment.⁸² For high-level radioactive wastes vitrification in borosilicate glass has been one of the most

⁷³ *Id.* at 24.

⁷⁴ Marine, *supra* note 54, at 162.

⁷⁵ *Id.* at 166. See also Symes, North Sea Fisheries: Trends and Management Issues, in North Sea: Perspectives on Regional Environmental Co-operation 271 (1990).

⁷⁶ Marine, *supra* note 54, at 173.

⁷⁷ *Id.* at 31, 171.

⁷⁸ *Id.* at 176.

⁷⁹ *Id.* at 179.

⁸⁰ Different sizes of transportable treatment units can treat different kinds of wastes produced by small and large quantity generators. Transportable treatment units can be brought onsite for as little as a few days or hours, or can stay there for weeks or months. The existing permit process in the United States has rendered the use of transportable treatment units very difficult. See S.I. Schwartz and W.B. Pratt, Hazardous Waste from Small Generators: Strategies and Solutions for Business and the Government 124-28 (1990).

⁸¹ Special Needs, *supra* note 3, at 270.

⁸² See S.E. Manahan, Hazardous Waste Chemistry, Toxicology and Treatment 253 (1990) [hereinafter Chemistry]. See also Minimization, *supra* note 1, at 41-43. For a detailed and simplified account of waste treatment techniques, see generally Special Needs, *supra* note 3, at 270-443. Physical treatment depends on the properties of wastes. Methods of physical treatment include sedimentation, decanting, floating, emulsion breaking, extraction, and sorption. Chemical treatment transforms wastes into non-toxic substances. Chemical treatment methods

frequently used treatment methods.⁸³ Vitrification essentially involves immobilization of liquid wastes by converting them into a monolithic solid.⁸⁴ Solidified high-level radioactive wastes contain two hundred times less plutonium and uranium than spent fuel.⁸⁵ Treatment methods for low-level radioactive wastes include separation,⁸⁶ compaction⁸⁷ and conditioning.⁸⁸ There are also treatment methods for mixed wastes.⁸⁹ For certain very low-level radioactive wastes it is appropriate to let them decay onsite and subsequently dispose of them as non-radioactive wastes.⁹⁰

1.4. Incineration

The purpose of incineration is the destruction of hazardous wastes.⁹¹ It is a method principally applied to organic wastes.⁹² Organic wastes, because they are highly combustible, may additionally be burned for energy recovery in industrial furnaces and boilers.⁹³ Incineration, however, is not free from environmental problems. Incineration ash can be more toxic than the initial wastes, and must be soundly disposed of.⁹⁴ Another disadvantage is that

include neutralization, chemical oxidation, chemical precipitation, chemical reduction, and electrolysis. Biodegradation applies only to biodegradable wastes. The properties of wastes can be changed, however, in order to increase biodegradability. Sometimes biodegradation can be achieved by the successful mixing of hazardous with household wastes. Biodegradation may be a more suitable method for developing countries that cannot afford chemical treatment.

⁸³ Vitrification has been used in France, Belgium and England. Another application of the technology concerns wastes already buried in the ground. In situ vitrification is expensive, but it may play an important role in isolating wastes that have been disposed of haphazardly and have begun to leak. *See* Low-Level, *supra* note 33, at 93.

⁸⁴ Series 54, *supra* note 32, at 13.

⁸⁵ *Id.*

⁸⁶ Low-Level, *supra* note 33, at 77.

⁸⁷ Compaction is a mechanical technique used to reduce the waste volume. "It increases the structural stability of wastes by increasing their density and it may reduce the dispersability by decreasing the surface area of the waste." Compactors are available in many treatment facilities. *See* Series 71, *supra* note 24, at 8. For more details on compaction, *see* Series 253, *supra* note 44, at 12.

⁸⁸ Conditioning's goal is to improve the waste characteristics by achieving incorporation of liquid wastes into some kind of solid matrix. Conditioning materials are, for example, cement and bitumen. *See* Series 71, *supra* note 24, at 8–9.

⁸⁹ For modes of treatment proposed for low-level and mixed wastes, *see* Series 54, *supra* note 32, at 14; Series 253, *supra* note 44, at 12–13. *See also* Low-Level, *supra* note 33, at 84.

⁹⁰ Low-Level, *supra* note 33, at 81 (onsite decay has been specifically proposed for materials that contain radioisotopes of half-lives no greater than 90 days – mostly medical low-level radioactive wastes).

⁹¹ In order to achieve this purpose, attention must be paid to the so-called three Ts of combustion: temperature, time, turbulence to which it may be added availability of oxygen. *See* Special Needs, *supra* note 3, at 655–56.

⁹² Chemistry, *supra* note 82, at 317.

⁹³ C.R. Brunner, *Handbook of Hazardous Waste Incineration* 143 (1989) [hereinafter *Handbook*].

⁹⁴ Chemistry, *supra* note 82, at 324. Dewatering and stabilization of the incineration ash is necessary before landfill disposal.

incineration causes air pollution. Air pollution control equipment – commonly known as scrubbers⁹⁵ – is very expensive, creates the additional problem of having to dispose of scrubber wastes,⁹⁶ and requires emission monitoring.⁹⁷ In addition, even if incineration achieves over 99 percent DRE, malfunctions can still occur; therefore, response systems are necessary.⁹⁸ Because of these problems, the United States has enacted, and the European Community is about to enact, standards for sound hazardous waste incineration.

The high-costs of incineration diminish its attractiveness to developing countries. It is doubtful whether the hazardous wastes of a single developing country can justify the economic costs of an incinerator. Even localities in developed countries have trouble feeding their incinerators, and have enacted, for that purpose, flow control laws that prohibit waste exportation.⁹⁹ Shortages of wastes may induce temporary close-downs that are both economically unprofitable and environmentally unsound.¹⁰⁰

In order to avoid the capital costs of constructing new incinerators, European countries have relied extensively on cement kiln incinerators.¹⁰¹ For this reason, cement kilns have also been proposed as a suitable treatment method for developing countries.¹⁰² Cement kilns are not only economical; they are viewed as providing excellent destruction of extremely hazardous wastes.¹⁰³

⁹⁵ Other pollution control equipment includes: cyclones, spray and packed towers, dry or irrigated electrostatic precipitation. See Special Needs, *supra* note 3, at 698.

⁹⁶ Major Problems, *supra* note 7, at 7.

⁹⁷ See S. Biles, Review of Municipal and Hazardous Waste Management Practices and Facilities in Seven European Countries 7–8 (1987) [hereinafter Seven European Countries]. (European countries, however, have achieved continuous monitoring by the assignment of onsite regulators, and construction of portable laboratories and equipment. “The best example was in Vienna where continuous 24-hour a day monitors were established at all the major incinerators. The fundamental parameters are sampled, and the information is relayed through telephone hookups to a centralized computer in the office of the regulatory agency. This allows for an extremely efficient and accurate monitoring of environmental performance. When emissions violate a permit level or a federal air standard, an alarm is sounded and regulatory staff can be quickly mobilized to undertake more detailed monitoring and to confirm the computer report.”).

⁹⁸ Special Needs, *supra* note 3, at 710.

⁹⁹ See, e.g., Lyall, Suddenly, Towns Fight to Keep their Garbage, N.Y. Times, Jan. 5, 1992, at 14, col. 1. Seven European Countries, *supra* note 97, at 6.

¹⁰⁰ Seven European Countries, *supra* note 97, at 6. (“From an environmental standpoint, it is clear that an incinerator needs to operate 365 days a year to maximize emission reduction. As an incinerator is cooled and then restarted, emissions increase significantly. Thus, it is in the economic and environmental interests that an incinerator be utilized to capacity.”).

¹⁰¹ Generally, European Community countries have used incineration more extensively than the United States. The 1980s incinerators, in contrast with the older ones, are designed with “state-of-the-art” pollution control equipment. See Davis, Shifting the Burden off Land: The Role of Technical Innovations, in America’s Future in Toxic Waste Management: Lessons from Europe 42 (Piasecki and Davis eds. 1987) [hereinafter Future].

¹⁰² Special Needs, *supra* note 3, at 70.

¹⁰³ “[C]ement kilns currently are achieving a remarkable destruction and removal efficiency for principal organic hazardous constituents of at least 99.99%.” In addition, they burn hazardous wastes only at a fraction of the costs charged by waste incineration firms and, in some instances,

The potential competition between incineration and recycling is another important policy concern. Recycling enterprises may keep away from areas with strong incineration programs because of the scant prospects for profits.¹⁰⁴ Incinerators' continuous demand for hazardous wastes may also undermine waste reduction efforts. For this reason, access to global waste markets becomes very important. Incinerator owners unable to feed their facilities with local wastes could seek other regions' wastes, and thus be less prone to undermine local waste minimization efforts.

Incineration has also been used for the treatment of certain mixed and low-level wastes and solvents.¹⁰⁵ Most European countries incinerate their combustible low-level wastes before storage or final disposal.¹⁰⁶ In the United States, 40 percent of low-level wastes generated are combustible, but volume reduction is accomplished primarily by compaction.¹⁰⁷

1.5. Recycling and Reprocessing

Recycling has been promoted by environmentalists as a sounder waste management method than incineration and land disposal.¹⁰⁸ In fact, certain hazardous wastes such as waste oils, metals and solvents can be recycled.¹⁰⁹ The major obstacles to recycling are the unstable markets for recycled products,¹¹⁰ and producers preference for raw materials because of their consistent quality.¹¹¹ Recyclable materials may also be contaminated by other materials that are difficult and expensive to separate.¹¹² Ironically, laws encouraging recycling and waste minimization contribute to the instability of international markets by increasing the supply of recyclable materials

they charge nothing. In fact, according to the estimates of the cement industry, there are enough cement kilns in the United States to handle all the combustible wastes produced, and they are conveniently located within 300 miles of virtually every waste generator in the country. *See* Hiles and Wilkinson, *Bevill Amendment: Burning Hazardous Waste in Cement Kilns*, 55 *Missouri Law Review* 391, at 409 (1990). Other devices that can be used as incinerators of hazardous wastes exist in the brick and tile industry, copper smelting, glass industry, iron and steel industry, lead production, lime production and zinc production. *See* Handbook, *supra* note 93, at 158-77.

¹⁰⁴ Seven European Countries, *supra* note 97, at 6-7.

¹⁰⁵ Safety Series 253, *supra* note 44, at 11-12.

¹⁰⁶ Low-Level, *supra* note 33, at 91.

¹⁰⁷ Environmental Radioactivity, *supra* note 37, at 253.

¹⁰⁸ Recycling, however, is not a simple process even for solid wastes, let alone hazardous wastes. *See* Holusha, *The Tough Business of Recycling* Newsprint, N.Y. Times, Jan. 9, 1991, at 9, col. 1.

¹⁰⁹ *See* Chemistry, *supra* note 82, at 255-64.

¹¹⁰ Solid Waste Report/Slants and Trends, Business Publishers Inc., Oct. 1, 1992 (Lexis, Nexis, Omni File). *See also* Butlin, *The Prices of Secondary Materials and Recycling Effort*, in *Resource Conservation: Social and Economic Dimensions of Recycling* 207 (Pearce and Walter eds. 1977).

¹¹¹ Survey, *supra* note 4, at 9, Chapter 1.

¹¹² *Id.*

without simultaneously stimulating demand.¹¹³ For this reason, it has been suggested that government support for recycling enterprises, with subsidies or other forms of intervention, is necessary.¹¹⁴ In developed countries, however, subsidies have distorted competition,¹¹⁵ and because of the prevalence of scavenging in developing countries, could deprive some the world's poorest people of their livelihood.¹¹⁶ Subsidized recycling can also lead to illegal waste trafficking as evidenced by the German packaging law.¹¹⁷

Reprocessing of radioactive wastes is also quite controversial. The purpose of reprocessing is to recover the uranium and plutonium of spent nuclear fuel. Reprocessing reduces the volumes of high-level radioactive wastes, but creates greater volumes of intermediate- and low-level wastes.¹¹⁸ Sweden, United States and Canada do not engage in reprocessing because they view it as undesirable for economic and national security reasons.¹¹⁹ Reprocessing is undesirable because it produces plutonium that can be used in the production of nuclear weapons. It is also unnecessary because uranium supplies seem adequate to satisfy the current demand, especially because of the uncertain future of nuclear power. Other countries, however, such as France, England, Germany and Japan view reprocessing as an essential part of the fuel cycle,¹²⁰

¹¹³ See, e.g., Hirschler, Recycled Rubbish Prices Plunge as Europe Goes "Green," The Reuter Library Report, Sept. 16, 1992 (Lexis, Nexis, Omni File).

¹¹⁴ Seven European Countries, *supra* note 97, at 5.

¹¹⁵ Holusha, Market is Shriveling for Recycled Plastics, N.Y. Times, June 2, 1992, at D5, col. 3. See also Rag and Bone Moans, Economist, Aug. 22, 1992, at 60 (for example, the stringent German packaging laws have increased the quantities of available waste paper to such an extent that waste collectors pay German paper makers to take the wastes back. The abundance of German recyclable wastes has increased the quantities of waste paper imported in Britain at cheaper prices than the British recyclable paper. Consequently, Britain will have to recycle less domestic waste paper than it used to. But, due to the transportation costs, imported waste paper is more expensive in Britain than in Germany, and this diminishes the competitiveness of the British recycling industry). See also Rubbish: Green Behind the Ears, Economist, July 3, 1993, at 46. A similar problem has been created in France. French waste-paper merchants have demonstrated in the streets of Paris against German imports of recyclable wastes.

¹¹⁶ Survey, *supra* note 111, at 13.

¹¹⁷ See Chapter 4, Section 2.1.

¹¹⁸ International Politics, *supra* note 34, at 12.

¹¹⁹ *Id.*

¹²⁰ *Id.* In Britain, the development of a reprocessing plant (THORP) has been delayed because of public opposition, and doubts about whether another reprocessing facility will be economically viable. See BNFL's THORP: Asset or Liability?, Power Europe, Aug. 28, 1992 (Lexis, Nexis, Omni File); Lascelles and Tighe, N-Plant Reprocessing Delay Ordered, Financial Times, Oct. 24, 1992, at 4 (Lexis, Nexis, Omni File). The profits from current reprocessing, however, are significant. See BNFL Reports Increase in New Annual Report, Nuclear News, Oct. 1992, at 58 (Lexis, Nexis, Omni File). Public opposition against THORP has augmented lately because of fears that the absence of storage facilities for reprocessed fuel in the exporting countries will render Britain "the world's nuclear dustbin." See Wilkie, Ministers Suppress N-Waste Warning, The Independent, Feb. 28, 1993, at 1 (Lexis, Nexis, Omni File). Cogéma, a nuclear company owned by the French Atomic Energy Agency, reprocesses French and other countries' wastes, for example, wastes from Germany, Belgium, Japan, Netherlands. See International Politics, *supra* note 34, at 293. France has already doubled the capacity of La

or as a way to postpone painful decisions on permanent waste disposal.¹²¹ The insistence of these countries on reprocessing has caused friction in international relationships. The transfers of reprocessed spent fuel from France to Japan, in combination with the latter's decision to modify its nuclear energy production in order to use mixed plutonium and uranium,¹²² has caused great anxiety to its neighboring countries that estimate that Japan has accumulated more plutonium than it needs for peaceful purposes.¹²³ The international pressure has been so strong that Japan has promised to reconsider shipments of nuclear fuel.¹²⁴ Such reconsideration seems doubtful, however, given that Japan is under pressure from France to take back its reprocessed wastes.¹²⁵

Moreover, the collapse of Eastern Europe, and accompanying treaties for the destruction of nuclear weapons, have introduced an additional dimension in the international politics of nuclear waste. In order to prevent nuclear weapons from falling into the hands of terrorists or undemocratic regimes, the United States agreed with Russia to purchase the weapons destined for destruction, and use them as fuel in its nuclear power plants.¹²⁶ The increased

Hague reprocessing plant. See French Waste Unit Capacity Doubled, European Energy Report, May 1, 1992 (Lexis, Nexis, Omni File).

Switzerland's spent nuclear fuel is sent to other countries for reprocessing. See Regulatory Framework, *supra* note 4, at 112. Germany's spent nuclear fuel is reprocessed in other countries, such as the United Kingdom and France. Germany has decided not to develop indigenous reprocessing capacity and the pilot-scale reprocessing plant (WAK) at Karlsruhe is in the process of being decommissioned. The costs of dismantling the plant are \$1.2 billion and the federal and state governments, as well as the utilities will share the bill. See WAK Owners Sign Pact to Fund Decommissioning, Nuclear News, Feb. 1992, at 78 (Lexis, Nexis, Omni File). The new draft atomic energy law in Germany contemplates a total ban on reprocessing. See Germany's Atom Law Turmoil, Power Europe, Aug. 14, 1992 (Lexis, Nexis, Omni File).

¹²¹ Hibbs, Industry Seeks Accord with Bonn Over German Fuel Cycle Future, NuclearFuel, July 6, 1992, at 4 (Lexis, Nexis, Omni File).

¹²² Except for Japan, several countries strive to develop mixed-oxide (MOX) fuel from reprocessed wastes. Mixed-oxide fuel will contain both uranium and plutonium, and will be used in existing nuclear energy plants as an alternative to uranium. In Britain BNFL has formed a new subsidiary that will engage in the fabrication of MOX fuel. See Hibbs, BNFL to Decide This Year Whether to Build MOX Facility, NuclearFuel, Sept. 14, 1992, at 10 (Lexis, Nexis, Omni File). France also plans to construct a MOX fuel fabrication plant. See Hibbs, Industry Seeks Accord with Bonn Over German Fuel Cycle Future, NuclearFuel, July 6, 1992, at 4 (Lexis, Nexis, Omni File). In Germany attempts to restart the Hanau MOX facility, constructed by Siemens, and closed down temporarily after a contamination incident, have not been successful. See *id.* Belgium has already operated the first experimental facility loaded with MOX fuel and it is building a commercial MOX facility. See Electrabel Wants to Use MOX in Two Reactors, Nuclear News, July 1992, at 53 (Lexis, Nexis, Omni File).

¹²³ France Seeks to Ease Fears of Plutonium Ship, Wash. Post, Oct. 17, 1992, at A15 (Lexis, Nexis, Omni File).

¹²⁴ Sanger, Japanese May Cut Atomic Shipments, N.Y. Times, Nov. 14, 1992, at 1, col. 1.

¹²⁵ Usui and MacLachlan, Japan Expresses "Surprise" at Cogéma Date for HLW Return, NuclearFuel, Feb. 1, 1993, at 9 (Lexis, Nexis, Omni File).

¹²⁶ See Neff, A Grand Uranium Bargain, N.Y. Times, Oct. 24, 1991, at A26, col. 2; Broad, From Soviet Warheads to U.S. Reactor Fuel, N.Y. Times, Sept. 6, 1992, at 4, Sec. 4, col. 1. But see also Broad, Russia Has Far More A-Fuel Than U.S. Thinks, Study Says, N.Y. Times, Sept. 11, 1992, at A8, col. 1.

supply of uranium and plutonium¹²⁷ in the international markets resulting from the destruction of nuclear weapons makes reprocessing increasingly unnecessary. It has also spurred demands to establish a UN register for plutonium.¹²⁸ The IAEA has also recommended the cessation of all reprocessing,¹²⁹ and has proposed to become a sort of trustee for all the existing quantities of plutonium in order to prevent their diversion to nuclear weapon production.¹³⁰ It is questionable, however, whether the IAEA's proposal will influence the policies of countries determined to proceed with reprocessing.¹³¹

In the meantime, incidents of thefts of nuclear materials are on the rise on the borders between Eastern and Western Europe.¹³² For the moment, it does not appear that these incidents involve types or quantities of radioactive wastes that could be used for nuclear weapon production.¹³³ The United States also has launched a crusade against developing countries suspected of producing nuclear energy for military purposes.¹³⁴ Sometimes double standards are applied. North Korea, for example, has been under severe pressure not to develop reprocessing plants, while Japan has not, because

¹²⁷ See World Status Report: Plutonium, *Energy Economist*, May 1992 (Lexis, Nexis, Omni File). ("In 1990, less than 30 percent of the amount of fissile plutonium isolated by reprocessing was incorporated into reactor fuel. In the year 2000, the figure will probably be 75 percent. It is expected that this imbalance between fissile plutonium production on the one hand and the demand for fissile plutonium for fuel fabrication on the other will, during the period 1990-2000, result in the stockpiling of 110 tons of fissile plutonium already stockpiled in Europe.").

¹²⁸ Laroi, *World Register of Plutonium, Uranium Needed*, The Reuter Library Report, Mar. 1, 1993 (Lexis, Nexis, Omni File).

¹²⁹ See Seneviratne and MacLachlan, *IAEA Cancels Plutonium Talks Under Pressure from U.S.*, *NuclearFuel*, Sept. 14, 1992, at 5 (Lexis, Nexis, Omni File). See also World Status Report: Plutonium, *Energy Economist*, May 1992 (Lexis, Nexis, Omni File).

¹³⁰ *Id.* (the IAEA has proposed the development of an International Plutonium Storage (IPS) facility. This is not a new idea. It was initially proposed in the beginning of 1980s, but it was not supported by states).

¹³¹ See MacLachlan, *Belgian Utility Announces Plans to Load Mox Fuel in Two Reactors*, *NuclearFuel*, May 25, 1992, at 8 (Lexis, Nexis, Omni File); MacLachlan, *Japanese Utility Leader Pledges Building of Three FBRs by 2030*, *Nucleonics Week*, April 23, 1992, at 8 (Lexis, Nexis, Omni File); *Japan to Ask UK, Belgium to Produce Uranium-Plutonium Mix*, Report from Japan, Oct. 12, 1992 (Lexis, Nexis, Omni File). But see also MacLachlan, *Superphenix Decision Could Signal Trouble for All Pu Use Programs*, *NuclearFuel*, July 6, 1992, at 12 (Lexis, Nexis, Omni File).

¹³² See Kaufman, *Nuclear Entrepreneurs Cash In*, *Calgary Herald*, July 12, 1992, at B10 (Lexis, Nexis, Omni File); *German Politician Warns of "Nuclear Mafia" Smuggling Ring*, The Reuter Library Report, Oct. 18, 1992 (Lexis, Nexis, Omni File); Elliott, Tilley and Willan, *Mole Leads to Arms and Drug Arrests*, *Sunday Telegraph*, Oct. 11, 1992, at 2 (Lexis, Nexis, Omni File); *Police Swoop on Drugs, Find Uranium Instead*, The Reuter Library Report, Aug. 27, 1992 (Lexis, Nexis, Omni File). See also Chapter 4.

¹³³ *Base metals, Base exports*, *Economist*, Nov. 7, 1992, at 59.

¹³⁴ See Sanger, *North Korea Plan on Fueling A-Bomb May be Confirmed*, *N.Y. Times*, June 15, 1992, at A1, col. 6; Lewis, *Pakistan Tells of Its A-Bomb Capacity*, *N.Y. Times*, Feb. 8, 1992, at 5, col. 4; Sciolino, *China Will Build A-Plant for Iran*, *N.Y. Times*, Sept. 11, 1992, at A6, col. 1.

its commitment not to produce nuclear weapons is assumed to be more trustworthy. This assumption, because of historical experience, is not shared by North Korea or other Asian countries.¹³⁵ Moreover, requiring all countries to destroy their nuclear stockpiles, but allowing monopoly of nuclear weapons by one superpower, is as frightening as the dissemination of nuclear weapons to undemocratic regimes.¹³⁶

The controversy surrounding nuclear reprocessing and the instability of markets for recyclable wastes complicate decisions on whether, for the purposes of international movements, such substances should belong to the category of dangerous materials or wastes. If recyclable wastes are included in the category of materials, there is the danger that, free from controls that apply to the transportation of hazardous wastes, they will be exported under the pretext of recycling – but actually will be dumped. On the other hand, because of the multiple restrictions on waste exports, including recyclable materials in the waste category will discourage the development of markets for recycled products. The recent Community Regulation on recyclable wastes places stringent controls on their exportation, despite concerns of the recycling industry that such controls will harm recycling. The United States regulations, on the other hand, favor recycling of wastes that are marketable.

As I have already maintained, waste export controls in general, given the absence of monitoring and enforcement, will aggravate illicit dumping. The same holds true for recyclable wastes. Moreover, in the case of recyclable wastes attempts to control waste exports will not only lead to illegal disposal, but will also undermine existing and potential markets for recyclable materials. For this reason, wastes that can potentially be recycled should not be viewed, for the purposes of transnational movements, as ordinary wastes – especially, if there are markets for them.

Similarly, spent fuel that can be reprocessed should not be considered waste until it is permanently disposed of. This must be so despite the domestic policies of the concerned countries on reprocessing. As long as such fuel remains unburied, it may always be used for nuclear energy production, or nuclear weapon construction. More stringent safeguards should, therefore, accompany international spent fuel trade that need not apply to nuclear waste trade. Because spent fuel is linked with nuclear weapons, countries are bound to devote more resources to the implementation and enforcement of measures taken to safeguard it.¹³⁷ This may change if an international consensus develops not to engage in reprocessing. But it is arguable whether such a genuine

¹³⁵ Sanger, Japan Shipment of Nuclear Fuel Worries Asians, N.Y. Times, Nov. 9, 1992, at A6, col. 1.

¹³⁶ If Japan had developed the atomic bomb during World War II, it probably would have been able to deter an attack from the United States. *See also* Gordon, It's Official: U.S. Stops Making Material for Nuclear Warheads, N.Y. Times, July 14, 1992, at A18, col. 1.

¹³⁷ *See* Nuclear Suppliers Group: Guidelines for Nuclear Transfers, April 3, 1992, reprinted in 31 I.L.M. 1230 (1992); Nuclear Suppliers Group: Memorandum of Understanding Implementing Guidelines for Transfer of Nuclear-Related Dual-Use Equipment, Material and Related Technology, April 3, 1992, reprinted in 31 I.L.M. 1094 (1992).

consensus will ever develop, given the perennial greed of states for power and dominance.

2. THE UNITED STATES AND EUROPEAN MODELS

2.1. *The United States Model*

Hazardous wastes have been mismanaged in the United States ever since they were first generated. Unaware of the dangers involved, waste generators simply dumped wastes onsite or abandoned them in landfills. Haphazard disposal practices have created a large number of disposal sites that urgently need clean-up.¹³⁸ This number will increase because stringent waste legislation has forced the close-down of many landfills.¹³⁹ Yet a great number still survives¹⁴⁰ due to the number of exceptions, "variances," granted. These enterprises, apprehensive of not lasting for long, have slashed prices, and have seriously undermined the profits of larger national or regional companies.¹⁴¹ Bigger companies, therefore, have started to enter European and other international markets. The overseas expansion has also been attributed to the shrinking domestic market.¹⁴² However, it is acknowledged that the slow-down of the United States market¹⁴³ will not hamper the domestic growth of the waste management industry in the long-run.¹⁴⁴ It is certain also that

¹³⁸ See Chapter 5, Section 6.1.

¹³⁹ It is estimated that 14,000 city and town dumps have closed down within the last twenty years. See Montgomery, *Down in the Dumps*, Financial World, June 23, 1992, at 30 (Lexis, Nexis, Omni File).

¹⁴⁰ Survey, *supra* note 4, at 5, Chapter 1 ("the Environmental Protection Agency (EPA) had estimated in 1986 that the 6,034 landfills then open would decline to 2,000 by 1992." Today, the authors of the Survey estimate that the number of landfills must be around 6,600 which is more than the EPA estimate for 1986).

¹⁴¹ *Id.* There are many companies in the United States with nationwide networks involved in all the aspects of hazardous waste management, such as U.S. Ecology, Rollings Environmental Services, Safety Kleen, Chemical Waste Management, GNI, Allwaste. Certain companies maintain other operations besides hazardous waste management. Consolidated Rail Corp.'s, for example, main operation is the railroad. Companies with regional operations are Clean Harbors and Enviropact both of which provide environmental services for the Northeast. Unitek Environmental Services conducts operations in Hawaii and eleven countries and territories throughout the Pacific.

¹⁴² Montgomery, *supra* note 139.

¹⁴³ See Holusha, *The Big Cleanup Slows to a Crawl*, N.Y. Times, June 22, 1992, at D6, col. 3; Feder, *Browning-Ferris Unnerves Wall St.*, Sept. 5, 1991, N.Y. Times, at D10, col. 3; Holusha, *Chemical Waste's Regulatory Woes*, N.Y. Times, Sept. 4, 1991, at D8, col. 3.

¹⁴⁴ See Bukro, *Environmental Firms Hone '90s Tactics*, Chicago Tribune, Oct. 11, 1992, at C3 (Lexis, Nexis, Omni File); *Tioxide Plans New 90's Plants*, Chemical Marketing Reporter, July 13, 1992, at 5 (Lexis, Nexis, Omni File). Even companies that used to pollute have started to enter the waste management industry. See Efron and Gomez, *Cleaning Up on Cleanups*, L.A. Times, Sept. 15, 1991, at D1, col. 1 (Lexis, Nexis, Omni File); Rotman and Roberts, *Vulnerability in Commercial Markets*, Chemical Week, Aug. 19, 1992, at 41 (Lexis, Nexis, Omni File).

the increase in environmental consciousness in other parts of the world will foster the expansion of the overseas market, especially, in Eastern Europe and Southeast Asia.¹⁴⁵

In Asia, wastes are grossly mismanaged as evidenced by the extensive illegal waste transfers in the region.¹⁴⁶ In Japan, for instance, 1,890,000 tons of industrial wastes were illegally dumped in 1990 – 118 percent more than the previous year.¹⁴⁷ Wastes are the responsibility of private enterprises which have relied principally on land disposal and, given the shortage of space, on incineration.¹⁴⁸ Environmental legislation is rarely implemented and is not vigorously enforced.¹⁴⁹

2.2. The European Model

Contrary to the United States and Japan, the European Community countries have viewed hazardous waste management as a public works project.¹⁵⁰ Most of the European facilities have been built with the assistance of the state or local governments. One of the best known management facilities, Kommunekemi, is owned by Danish municipalities. Kommunekemi is an integrated facility consisting of an incineration plant, a waste oil recovery plant, a treatment plant, and a landfill. Heat recovered by the incineration facility provides 35 percent of the heat demand in the nearby city.¹⁵¹ The facility is also supported by a network of transfer stations that minimize the distance between the generators and the facility.¹⁵² Wastes that cannot be disposed of at the facility are transferred to a salt mine in West Germany.¹⁵³ With this type of services Kommunekemi seems to be an ideal facility, capable of attracting industry's compliance. Unfortunately, this has not been the case. Illegal dumping takes place in Denmark as it does in other European countries. This is because any type of waste management is more expensive than

¹⁴⁵ East Europe Waste Management Market Projected at \$2.55 Billion by '95, Integrated Waste Management, Nov. 27, 1991 (Lexis, Nexis, Omni File). Southeast Asian Development Plans Seen Opening Markets for U.S. Firms, Integrated Waste Management, Dec. 11, 1991, at 5 (Lexis, Nexis, Omni File). Blake, Radwaste Management in Eastern Europe, Nuclear News, Feb. 1992, at 70 (Lexis, Nexis, Omni File) (Westinghouse's European subsidiary will build the first low-level processing facility in Europe).

¹⁴⁶ See Chapter 4, Section 2.1.

¹⁴⁷ Moore, The Greening of Japan, Chemical Engineering, Oct. 1992, at 30 (Lexis, Nexis, Omni File). For the extent of illegal disposal in previous years, see International Technologies, *supra* note 6, at 34.

¹⁴⁸ Moore, *id.* "Industrial waste landfills can only handle another 1.5 years of wastes, according to the Ministry of Health & Welfare ..., and municipal waste landfills, another eight years' worth."

¹⁴⁹ *Id.*

¹⁵⁰ Davis and Piasecki, Concluding Remarks: The Next Step After Land Disposal, in Future, *supra* note 101, at 223, at 225.

¹⁵¹ Davis, *supra* note 101, at 44.

¹⁵² *Id.* (no generator is more than a 30-mile away from the nearest transfer station).

¹⁵³ International Technologies, *supra* note 6, at 28.

illegal disposal. This "competitive advantage" of illegal trafficking over waste management stresses the importance of access to global waste markets advocated in this study. The influx of wastes from other regions render integrated facilities more profitable and reduce the costs of waste management services. Transnational waste management based on scale economies can compete more successfully with illegal trafficking because it makes possible cheaper waste management. This is especially so if cheaper waste management is paired with liability rules and wide publication of the penalties imposed on illegal traffickers.¹⁵⁴

Integrated facilities, partly or wholly owned by local governments, have been popular in many other European countries.¹⁵⁵ Often integrated facilities take the form of joint ventures between the government and private enterprises. Simultaneously, a significant number of private waste collectors and treatment companies exist.¹⁵⁶

2.3. *Towards a Mixed System?*

The European model of integrated facilities and close cooperation between governments and the private sector has been proposed for application in the United States. According to the proponents of the European model, the United States should view hazardous waste management as a public works project similar to the construction of highways. Hazardous waste, according to this position, is a chemical engineering problem and hazardous waste facilities should bear closer resemblance to chemical plants rather than contaminated and leaking landfills.¹⁵⁷ The option of developing regional integrated facilities has yet to be systematically examined in the United States. However, the European system is not flawless. In European countries, in order to sustain their ambitious projects, many localities have imposed controls on waste

¹⁵⁴ See Chapter 1, Section 4.2.1. See also Davis, Linnerooth and Piasecki, Government Ownership of Risk: Guaranteeing a Treatment Infrastructure, in Future, *supra* note 101, at 95, 123. ("In Denmark officials believe they have captured most of the chemical waste generated by industry in the system of municipally owned transfer stations and the Kommunekemi facility [However], in 1984 a Danish firm was caught disposing of chemical waste in a municipal dump and was the focus of a very public enforcement action [emphasis added]. Following this incident, there was significant increase in the amount of waste received by Kommunekemi, possibly indicating that several other firms had been using illegal practices.").

¹⁵⁵ For example, the ZVSMM facility in Bavaria, Germany, is owned and operated by the municipal governments. The SAKAB facility in Sweden was until recently a state-owned company. In other cases, it is joint ventures between government and industry that construct and operate facilities. The GSB facility in Bavaria is semi-public and the HIM facility in Hessen, Germany, was originally owned by private companies but, when it faced financial difficulties, the government intervened and assumed joint responsibility with the private enterprises. See *id.* at 95–117. AVK-Chemie was also until recently owned by the government, the city of Rotterdam, and eight municipalities. See International Technologies, *supra* note 6, at 34–36.

¹⁵⁶ See also Piasecki and Messinger, Establishing Collection Systems: Benefits of the Infrastructure Approach, in Future, *supra* note 101, at 201, 210.

¹⁵⁷ Piasecki and Davis, Restructuring Toxic Waste Controls: Intrinsic Difficulties and Historical Trends, in Future, *supra* note 101, at 1.

exports.¹⁵⁸ Waste generators able to dispose of their wastes more cheaply in other parts of their country or abroad have been reluctant to use the more expensive integrated facilities.

European governments have started moving away from public ownership and have started privatizing many of their state and municipal facilities. After the collapse of Eastern Europe, it is widely believed that private ownership and control will render waste management facilities more profitable. Waste Management, one of the largest United States companies, acquired the state-owned Swedish company SAKAB,¹⁵⁹ after acquiring forty private and public enterprises all over Europe.¹⁶⁰ Private European companies have started expanding overseas as well.¹⁶¹ What we are witnessing, therefore, in both the United States and Europe, is an increase in consolidation,¹⁶² privatization, and internationalization of the hazardous waste management industry. Consolidation and internationalization could very well assist in the development of economies of scale and transnational facilities. The ideal situation would involve a mix of the United States and European approaches: transnational facilities in competition with each other.

2.4. *The Interconnection between Hazardous and Radioactive Waste Management*

In contrast with hazardous waste management, radioactive waste management has been characterized by: a concern for future generations, consensus on the need for centralized repositories selected and operated by the state, and international cooperation with no antecedent in hazardous waste management. This cooperation is evidenced, especially within the context of the European Community, by reprocessing contracts, bilateral agreements¹⁶³ and

¹⁵⁸ *Id.*

¹⁵⁹ Bukro, *supra* note 144.

¹⁶⁰ Rotman and Roberts, *supra* note 144. Waste Management France is forming a partnership with one of the largest French construction groups, Société Auxiliare Enterprise, in order to develop solid waste collection, treatment and disposal services in France. *See* Waste Management France Forms Joint French Company with SAE, Integrated Waste Management, Sept. 30, 1992, at 2 (Lexis, Nexis, Omni File). Waste Management has formed joint ventures with NOAH, an enterprise controlled by the Norwegian government, and Minas de Almaden a mining company owned by the Spanish government in order to develop hazardous waste treatment and disposal facilities. *See* Waste Management Intl 2 – “Well Positioned for Future,” *Extel Examiner*, Oct. 14, 1992 (Lexis, Nexis, Omni File).

¹⁶¹ SARP, one of the top French hazardous waste companies has already expanded beyond its borders by setting up subsidiaries in the United Kingdom and Italy. *See* Rotman and Roberts, *supra* note 144.

¹⁶² Phone Poulenc and SITA, two waste management companies in Europe, have merged and plan to expand. *See* Commission May Launch Inquiry Into French Waste Venture Plans, *European Report*, Nov. 11, 1992 (Lexis, Nexis, Omni File).

¹⁶³ Cogéma Looking for New Businesses, *Power Europe*, Aug. 14, 1992 (Lexis, Nexis, Omni File) (Cogéma signed a cooperation agreement with the Russian Atomic Energy Federation

waste exchanges. Waste exchanges are a new device used by European Community countries to facilitate radioactive waste management. The first such deal was struck between Belgium and Spain. Spain has agreed to exchange its small quantity of long-lived wastes for the more voluminous short-lived wastes of Belgium. Criteria for waste equivalencies, which would facilitate waste exchanges, have not been enacted yet.¹⁶⁴ However, general waste management programs have been adopted since the beginning of the 1980s.¹⁶⁵ The programs are financed by cost-sharing contracts involving competent public organizations or private firms in Member States. The latest program involves in situ experimentation in facilities of Member States.¹⁶⁶ Cooperation agreements also exist with countries outside the European Community, such as Canada, the United States, and Switzerland, as well as international organizations like IAEA.

As emphasized earlier, radioactive waste management is primarily the responsibility of the state.¹⁶⁷ Yet states are still incapable of locating final waste repositories because of the fierce public opposition, and unrelenting challenges to any decision that would finalize radioactive waste disposal.

(MINATOM) for the development of joint industrial and commercial projects regarding all the stages of nuclear fuel cycle). Sains, Swedes Agree to Aid Estonians in Radwaste Site Clean-Ups, *Nucleonics Week*, Mar. 19, 1992, at 3 (Lexis, Nexis, Omni File) (stopping leaks of radioactive waste into the Baltic, decommissioning two submarine reactors at Paldiski, and bringing a major waste dump up to international standards are part of a bilateral agreement between Sweden and Estonia).

¹⁶⁴ MacLachlan and Pilarski, Groups in Western Europe Looking at the Idea of Regional Waste Solutions, *NuclearFuel*, Sept. 28, 1992, at 3 (Lexis, Nexis, Omni File).

¹⁶⁵ See Proposal for a Council Decision adopting a programme on the management and storage of radioactive wastes (1985 to 1989), COM (84) 231 final; Proposal for a Council Decision adopting a specific research and technical development programme for the European Atomic Energy Community in the field of management of radioactive wastes (1990-94), COM (89) 226 final (until now Community projects and specifically MIRAGE (Migration of Radionuclides through the Geosphere) and PAGIS (Performance Assessment of Geological Isolation Systems) have shown that during thousands of years no radioactivity would escape from underground repositories for vitrified high-level wastes, if the repositories are well designed and the sites well chosen).

¹⁶⁶ *Id.* (the pilot studies involve a facility in West Germany, the Asse Salt Mine, the Mol facility in Belgium, where the suitability of clay is examined, and also facilities in France and Britain for the disposal of low- and intermediate-level wastes).

¹⁶⁷ Regulatory Framework, *supra* note 4, at 8. The nuclear industry has, however, contributed to radioactive waste management both financially and administratively. For example, in Sweden, SKB, the company that represents the nuclear industries, is jointly owned by four nuclear companies and the state-owned company that holds the majority share. The purpose of SKB is to coordinate the planning, construction and operation of nuclear facilities. General policy questions, however, are decided by the government. See Politics and Technology, *supra* note 51, at 96. In Switzerland the nuclear energy industry bears the financial burden of disposing of radioactive wastes. It is organized as a nonprofit private corporation, NAGRA, whose purpose is to study the final radioactive waste disposal. See Regulatory Framework, *supra* note 4, at 112. In Britain the government has approved the creation of NIREX composed of nuclear industries. In 1985, NIREX became a private company and acquired autonomy from the government and the capability to own sites, make contracts, and submit plans to the government. See Regulatory Framework, *supra* note 4, at 94-95.

These challenges have been stronger in states where power is decentralized, like the United States, Switzerland, or Germany.¹⁶⁸ But even in France¹⁶⁹ and Britain,¹⁷⁰ where power is more centralized, and nuclear energy has been inextricably linked with nuclear weapons, opposition is still fierce.¹⁷¹ In Sweden nuclear power was at the center of the political debate until the government decided to phase it out by the year 2010.¹⁷² Phasing out nuclear power has made possible some sort of consensus on nuclear waste disposal.¹⁷³

While permanent disposal awaits solution, reprocessing, onsite disposal, and central storage facilities are used, but their role in waste management is controversial.¹⁷⁴ The United States, for example, is still debating the develop-

¹⁶⁸ International Politics, *supra* note 34, at 28. ("Federalist systems allow extensive autonomy of decision-making [in general] in the state, lander or cantons. The nuclear industry in these countries is relatively weak, as the central governments are unwilling or unable to stifle anti-nuclear protests, and opposition in the courts The political context in these nations is thus one of fragmentation of decision-making, no pro-nuclear consensus, a relatively weak industry, strong and active opposition, and extensive opportunity for public participation through administrative and judicial channels that can thwart proposals for nuclear facilities.").

¹⁶⁹ International Politics, *supra* note 34, at 28, 288, 289 ("the issue [of radioactive wastes] is practically de-politicized [in France] and has produced comparatively little public debate or power struggles between political groups in the society So dominant has the nuclear sector become in France that some critics have dubbed it "the nucleocratic state.").

¹⁷⁰ *Id.* at 95.

¹⁷¹ *Id.* 84, 183. See also UK: Families Sue British Nuclear Fuels for Genetic Damage, *Greenwire*, Oct. 27, 1992 (Lexis, Nexis, Omni File); Lascelles and Tighe, N-plant Reprocessing Delay Ordered, *Financial Times*, Oct. 24, 1992, at 4 (Lexis, Nexis, Omni File). See also Dawkins, Business and the Environment, *Financial Times*, Dec. 5, 1990, at 37 (Lexis, Nexis, Omni File).

¹⁷² See International Politics, *supra* note 34, at 276 (twice governments have lost power over the issue of nuclear energy. The final determination about terminating the use of nuclear energy was made by a referendum in 1980).

¹⁷³ *Id.* at 277. But see also *id.* at 285–87.

¹⁷⁴ In Britain radioactive wastes are reprocessed. The government has also built a vitrification plant at Windscale for treatment of high-level radioactive wastes. See Payne, Waste Management '91, *Nuclear News*, April 1991, at 96 (Lexis, Nexis, Omni File). In France wastes are also reprocessed and vitrified, but a site for the disposal of high-level radioactive wastes has yet to be found. See International Politics, *supra* note 34, at 295.

Sweden has decided to dispose of high-level wastes without further reprocessing. After interim storage for forty years, the wastes will be shipped to a permanent repository. The Interim Storage facility (CLAB) started to operate in 1985. Because CLAB and the final repository are on the coast, the wastes are transported by a ship specially built for nuclear waste transport. A site for the permanent disposal of high-level radioactive wastes (SFL) has not yet been found. See International Politics, *supra* note 34, at 281–83; Ahlstrom, Current Status of the Swedish Waste Disposal Program, in H. Burkholder, *High-Level Nuclear Waste Disposal* 81 (1986).

Switzerland's spent nuclear fuel is sent to other countries for reprocessing. A high-level radioactive waste repository must be ready by 2020. However, Switzerland still has hopes that an international high-level repository will be built. See Regulatory Framework, *supra* note 4, at 113; MacLachlan and Pilarski, Groups in Western Europe Looking at Idea of Regional Waste, *NuclearFuel*, Sept. 28, 1992, at 3 (Lexis, Nexis, Omni File).

Germany's spent nuclear fuel is reprocessed in other countries, such as England and France. Gorleben, the repository for high-level radioactive wastes, has not yet opened. However, an interim disposal facility has just opened. In fact, there is currently discussion in Germany to ban

ment of a Monitored Retrievable Storage (MRS) facility that would shorten the distance between nuclear plants in the East and the permanent repository to be built in the West. The MRS Commission, in its proposal to the United States Congress, recommended the construction of a Federal Emergency Storage Facility (FES) that will take care of the wastes resulting from nuclear accidents, and a User-Funded Interim Storage facility for utilities with no space for onsite radioactive waste storage.¹⁷⁵ The United States is also the only country in the world that has developed a regional scheme for low-level radioactive waste management, and shifted responsibility for that management to the state level. For reasons examined below, this regional solution has not been very successful.¹⁷⁶

In general, in the United States, European Community, and Japan, radioactive waste management policies differ dramatically from hazardous waste management policies. In the United States and Japan hazardous waste has been managed by private enterprises, and in Europe it has been managed by local governments or public-private joint ventures. Radioactive waste, on the other hand, has been the responsibility of the central governments. Sites for hazardous waste disposal have never been accorded even half the effort and resources devoted to the search for a permanent radioactive waste repository, even though it is generally recognized that toxic wastes may be more hazardous, in the long-run, than nuclear wastes. No mention is ever made of centralized or international hazardous waste disposal facilities. Regional hazardous waste facilities are mentioned only in the relevant literature or sporadic proposals of environmental agencies.

The divergent policies underlining hazardous and radioactive waste management are due to the linkage of radioactive wastes with nuclear weapons. Yet hazardous wastes could benefit not only from the methods of nuclear waste treatment, but also from the policies of nuclear waste management, which emphasize planning, international cooperation and the welfare of future generations.

3. WASTE MANAGEMENT IN DEVELOPING COUNTRIES

Hazardous waste management in developing countries should be based on planning and regional facilities capable of accommodating wastes from many

reprocessing and start storing wastes temporarily before final disposal. It has been estimated, however, that if reprocessing is abandoned, the government must be ready to license Ahaus-size interim storage facilities at the rate of one every three years. *See International Politics, supra* note 34, at 254-55; Atomic Energy Law, Power Europe, Aug. 1992 (Lexis, Nexis, Omni File).

¹⁷⁵ *See* Report of the Monitored Retrievable Storage Review Commission, Nuclear Waste: Is There a Need for Federal Interim Storage? (Nov. 1, 1989).

¹⁷⁶ For more details on low-level radioactive waste management in the United States, *see* Chapter 5, Section 5.

developing countries. Developing countries usually have a large number of medium-sized and small enterprises.¹⁷⁷ It is reasonable hence to expect that national, regional or transnational facilities, taking advantage of scale economies, will benefit more developing countries than local facilities.¹⁷⁸

The problem is that sound waste management is not a priority issue for developing countries. Developing countries, anxious to grow, have been slow to enact, implement and enforce environmental legislation.¹⁷⁹ They also frequently do not have the resources, infrastructure, institutions, and personnel to engage in sound waste management.¹⁸⁰ Technology transfers from industrialized countries are frequently unhelpful either because they are too sophisticated and capital-intensive, or because they are not adjustable to the prevailing social conditions in developing countries. State-of-the-art equipment, which is expensive to replace in case of malfunctions, and for which capable local engineers are unavailable,¹⁸¹ is unsuitable for developing countries.¹⁸² Developing countries may be better off if they apply less costly and complicated technologies that are easier to manufacture, operate and maintain.¹⁸³ For instance, it is considerably less expensive and equally environmentally sound, if developing countries use natural, instead of artificial, liners for landfills. Natural liners are made of materials, which are readily available, and the techniques they require are labor-intensive.¹⁸⁴

The more advanced developing countries have increasingly started to adopt environmental legislation and engage in waste management projects. In Malaysia, for example, there has been tremendous pressure to accelerate plans to build a national treatment facility because onsite storage space is becoming gradually unavailable, while wastes are increasing at a rate of 8 percent a year. It is maintained, however, that unless the government takes

¹⁷⁷ Biswas, *Environmental Aspects of Hazardous Waste Management for Developing Countries: Problems and Prospects*, in *Management*, *supra* note 12, at 261, 284.

¹⁷⁸ *Special Needs*, *supra* note 3, at 60–65, 95.

¹⁷⁹ Mahajan, *Hazardous Waste Management in India: Policy Issues and Problems*, in *Management*, *supra* note 177, at 286.

¹⁸⁰ Biswas, *supra* note 177, at 266–69.

¹⁸¹ Jones and Robinson, *High Growth Predicted for Mexico's Burgeoning Environmental Protection Industry*, *American Chamber of Commerce of Mexico – Business Mexico*, Jan./Feb. 1993 (Lexis, Nexis, Omni File).

¹⁸² See Schaumburg, *Environmental Management in Developing Countries*, in *Appropriate Waste Management for Developing Countries*, at 31, 33 (Curi ed. 1985) [hereinafter *Appropriate Management*] (an advisor from an American university ordered the purchase of \$16,000 equipment in a developing country where he was invited to teach a course addressed to undergraduate engineers. The whole budget for the program was \$25,000. A year after the purchase the equipment remained in its package "because (a) there was no one in the program to operate it (the advisor had departed); (b) there was no place to put it; and (c) water quality data obtained by such a sensitive instrument would have little value since most of the country was without a sewerage system and there were no environmental laws or regulations.").

¹⁸³ *Id.* at 35.

¹⁸⁴ Edil, *Appropriate Waste Containment Technology for Developing Countries*, in *Appropriate Management*, *supra* note 182, at 619.

measures to curb illegal disposal, the national facility will be unprofitable, and will eventually have to close down.¹⁸⁵ The government, in order to finalize the construction of the facility, is actively seeking private investment.¹⁸⁶ It has issued special investment and tax incentives to promote sound waste management, and has extended import duty exemptions to importers of hazardous waste technology.¹⁸⁷ Singapore, which is frequently involved in illegal disposal, plans to build a disposal and incineration facility.¹⁸⁸ Thailand is about to sponsor several waste treatment plants because its waste production between 1986 and 1991 has almost doubled.¹⁸⁹ Many Mexican companies have formed joint ventures with United States and Canadian industries. It is hoped that the infusion of capital and technology as well as personnel training will enable the Mexican environmental services industry to become very profitable in the near future.¹⁹⁰ In 1991, Tunisia established a Ministry of the Environment,¹⁹¹ and plans to spend \$600 million to clean up environmental pollution. South Korea and Argentina have enacted waste management legislation.¹⁹² This legislation in many instances incorporates economic incentives to induce industry's compliance. The Argentinean law, for example, provides that industries must pay a fee according to the danger posed by their wastes, which cannot exceed 1 percent of the average presumed profit of the waste generating activity.¹⁹³

The search for a permanent radioactive waste repository has also been prevalent in developing countries that produce nuclear energy.¹⁹⁴ There is not significant information on the management of low-level radioactive wastes in

¹⁸⁵ Arasu, Toxic Waste Threatens Malaysian Environment, *The Reuter Library Report*, Jan. 15, 1992 (Lexis, Nexis, Omni File).

¹⁸⁶ Southeast Asian Development Plans Seen Opening Markets for US Firms, *Integrated Waste Management*, Dec. 11, 1992 (Lexis, Nexis, Omni File).

¹⁸⁷ *Id.*

¹⁸⁸ *Id.*

¹⁸⁹ *Id.*

¹⁹⁰ Jones and Robinson, *supra* note 181.

¹⁹¹ Nation Plans to Spend \$600 million on Pollution Control Over Four Years, *BNA International Environment Daily*, May 15, 1992 (Lexis, Nexis, Omni File).

¹⁹² Through a Cleaner Looking Glass, *Legal Times*, May 11, 1992, at 16 (Lexis, Nexis, Omni File).

¹⁹³ Argentina, Thomson Publishing Corporation, LDC Debt Report/Latin American Markets, Mar. 9, 1992, at 4 (Lexis, Nexis, Omni File).

¹⁹⁴ See Demonstrators Protest Against Government Plans to Build Nuclear Waste Dump, Summary of World Broadcasts, Jan. 1, 1992 (Lexis, Nexis, Omni File); Officials Deny Republics Exporting Uranium Fears of Uranium Leakage Expressed, Summary of World Broadcasts, Jan. 16, 1992 (Lexis, Nexis, Omni File); Argentina: Controversy Surrounding Nuclear Waste Dump Site, *NotiSur - South American and Caribbean Political Affairs*, Jan. 22, 1992 (Lexis, Nexis, Omni File); South Korea May Give New Aid to Waste Site Areas, *NuclearFuel*, May 25, 1992, at 10 (Lexis, Nexis, Omni File) (South Korea is preparing legislation that would provide financial support to communities that would host radioactive waste disposal facilities).

countries, but there exist indications of gross mismanagement.¹⁹⁵ The linkage between nuclear energy and nuclear weapons has deterred to some extent nuclear waste dumping in the third world, but it has not totally halted such dumping.¹⁹⁶

¹⁹⁵ IAEA, *The Radiological Accident in Goiania (1988)* (the accident started with the theft of teletherapy unit abandoned in the partly demolished radiotherapy institute in Brazil. The theft and mishandling of the unit caused the contamination and deaths of numerous people and the pollution of a large area of land. Similar accidents have happened in Mexico, Algeria and Morocco).

¹⁹⁶ *See generally Chapter 4.*

minimized, they must be treated, stored or disposed of so as to reduce the present and future threats to human health and the environment.⁶ Overall, the statute regulates land disposal and incineration more than waste treatment, recycling and minimization. Some commentators, who view excessive regulation as a disincentive for recycling and treatment, favor this approach.⁷ Others feel, however, that standards for landfill disposal cannot constitute the basis of a national policy concentrating on waste minimization, treatment and recycling. According to these commentators, EPA should focus on developing standards and providing incentives for recycling and waste minimization.⁸ As explained above, the position of this study is that the prescription of land disposal standards is a pragmatic policy since most wastes are landfilled. Incentives, however, could have been used to bolster waste minimization and recycling.

RCRA defines hazardous wastes as solid wastes which, because of their "quantity, concentration, or physical, chemical or infectious characteristics may cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating illness."⁹ Solid wastes are also considered hazardous when they "may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed."¹⁰ Wastes, therefore, do not have to cause present harm to qualify as hazardous; potential harm is sufficient.

EPA has promulgated four criteria for defining hazardous wastes: ignitability, corrosivity, reactivity and toxicity.¹¹ These criteria are more limited than those prescribed in the Basel Convention and European Community legislation.¹² Based on these criteria, EPA has formulated four hazardous waste lists.¹³ In addition, EPA has listed a significant number of

obtain a permit for onsite treatment, storage, or disposal, a generator must provide EPA with at least an annual certification that there is a program in place to reduce hazardous wastes that minimizes present and future threats to human health and the environment. This provision, however, does not authorize EPA to interfere with the production process. *See* RCRA §3005(h), 42 U.S.C. §6925(h).

⁶ RCRA §3002(b), 42 U.S.C. §6902(b).

⁷ *See, e.g.,* Whisler, Crozier, Kimball III, Moellenberg and Wallis, Turning Gold into "Solid Waste": RCRA's Intrusion into the Industrial Process, 23 Arizona State Law Journal 555 (1991).

⁸ M.K. Landy, M.J. Roberts and S.R. Thomas, The Environmental Protection Agency: Asking the Wrong Questions 125 (1990).

⁹ RCRA §1004(5)(A), 42 U.S.C. §6903(5)(A).

¹⁰ RCRA §1004(5)(B), 42 U.S.C. §6903(5)(B).

¹¹ 40 C.F.R. 261, Subpart C. According to RCRA §3001(a), 42 U.S.C. §6921(a), hazardous waste criteria should include toxicity, persistence, degradability, potential for accumulation in tissue, flammability and corrosiveness.

¹² For a comparison among the Basel, European Community and RCRA definitions, *see supra* note 137, Chapter 2.

¹³ The so-called "F list" includes wastes from non-specific sources, essentially spent solvents. *See* 40 C.F.R. 261.31. The K list includes wastes from specific sources, such as wastewater

hazardous constituents that, if detected in wastes, may justify their regulation as hazardous.¹⁴ In order to classify wastes containing these constituents as hazardous, EPA examines their concentration, degradation, persistence, bioaccumulation and the possibility of improper management.¹⁵ EPA may also list wastes that are typically or frequently hazardous.¹⁶ Wastes listed as hazardous may also be delisted. The delisting process is initiated by citizens. The final decision, however, is left to EPA which must consider, on top of the factors considered when the waste was originally listed as hazardous, newly presented factors, and must provide opportunity for public comment.¹⁷

The hazardous characteristics of waste are identified by testing.¹⁸ The Extraction Procedure (EP) test, as applied before the 1984 amendments, was deemed unreliable for the analysis of organic wastes, and for detecting the leaching potential of heavy metals and needed modification.¹⁹ Only in 1990, however, did EPA propose a new test called Toxicity Characteristic Leaching Procedure (TCLP).²⁰ EPA has also failed to comply with a RCRA deadline to list carcinogenic wastes.²¹

RCRA is not the only statute that defines hazardous wastes. There are other definitions, such as CERCLA's definition, and (Department of Transportation)

treatment sludge from mercury cell process in chlorine production. *See* 40 C.F.R. 261.32. The P list includes discarded commercial chemical products, off-specification container residues and spill residues presenting acute toxicity. *See* 40 C.F.R. 261.33(e). The U list includes discarded commercial chemical products, off-specification container residues, and spill residues presenting other characteristics, but not acute toxicity. *See* 40 C.F.R. 261.33(f).

¹⁴ 40 C.F.R. 261, Appendix VIII.

¹⁵ 40 C.F.R. 261.11(a)(3)(i–xi).

¹⁶ 40 C.F.R. 261.11(b). A mixture of hazardous and solid wastes presenting hazardous characteristics is considered hazardous waste. *See* 40 C.F.R. 261.3(a)(2)(iii–iv). Also, any residue of a treatment process of hazardous waste is considered hazardous waste. *See* 40 C.F.R. 261.3(c). These rules have been called “mixture” and “derived from” rules. On December 6, 1991, the United States court of appeals for the District of Columbia ruled that EPA had failed to give sufficient notice and opportunity for comment before promulgating the “mixture” and “derived-from” rules. The court vacated the rules and remanded them to the agency. *See* 57 Fed. Reg. 7628 (Mar. 3, 1992). RCRA has prepared the ground for listing PCBs as hazardous wastes by considering permits to incinerate PCBs under the Toxic Substances and Control Act as permits under RCRA. *See* RCRA §3005(a), 42 U.S.C. §6925(a). For more details on the disposal of PCBs, *see* 40 C.F.R. 761.60–761.79. EPA is considering revising the PCB regulations – which basically include incineration and landfill disposal – in order to allow for the introduction of innovative technologies, such as biodegradation, solvent extraction from soils and in situ vitrification. *See* 56 Fed. Reg. 26738 (June 10, 1991). Since 1989 generators, transporters and disposers of PCB wastes have to comply with detailed manifest requirements. *See* 40 C.F.R. 761.202–761.218.

¹⁷ RCRA §3001(f)(1), 42 U.S.C. §6921(f)(1). Petitions to delist waste must be granted within two years after the receipt of a complete application. *See* RCRA §3001(f)(2)(A), 42 U.S.C. §6921(f)(2)(A). For more details about the delisting process, *see* 40 C.F.R. 260.20–260.22.

¹⁸ RCRA §3001(g)-(h), 42 U.S.C. §6921(g)-(h).

¹⁹ *See* C. Harris, W.L. Want and M.A. Ward, *Hazardous Waste* 157 (1987) [hereinafter *Hazardous Waste*]. *See also* Regulation, *supra* note 7, at 42–43, Chapter 3.

²⁰ *See* 40 C.F.R. 261.24. *See also* 40 C.F.R. 261, App. II.

²¹ RCRA §3001(b), 42 U.S.C. §6921(b).

CHAPTER 4

Available Empirical Evidence

This Chapter provides an indicative account of cross-border waste shipments. Such shipments – especially to developing countries – gained great publicity by the end of the 1980s. The publicity led to the adoption of the Basel, Bamako and Lomé Conventions, analyzed in the second Chapter, which imposed restrictions and prohibitions on international waste transfers. Despite the adoption of these instruments waste exports have not declined.¹ Many waste exports are unlawful because waste shippers do not follow the emerging international norm of notifying and acquiring the consent of the importing country before the waste shipment. Others take place lawfully after the importing country has been notified and consented to the transfer.

1. THE LATE 1980S

Beginning in 1988, environmental groups and the press started reporting incidents of waste exports to developing countries.² For example, in the Nigerian port of Koko, drums mislabeled as construction material were found to contain 3,000 tons of Italian toxic wastes. The Nigerian authorities seized the ship and arrested twenty people threatening to execute those responsible.³ In addition, Nigeria recalled its ambassador from Rome.⁴ The Italian government agreed in principle to help remove the wastes, even though it was not the Italian government, but rather private companies that were involved in the dumping.⁵

¹ See *supra* notes 3–4, Chapter 1.

² For a detailed account of these incidents, see J. Vallette and H. Spalding, *International Trade in Wastes: A Greenpeace Inventory* (ed. 1990).

³ Porterfield, *Developing Countries Become Developing Dump for Toxics*, *WorldPaper*, Dec. 1988 (Lexis, Nexis, Omni File).

⁴ Hiltzik, *West's Waste Dumping Stirs Africa Controversy*, *L.A. Times*, June 19, 1988, at 9, col. 1.

⁵ Harden, *Africans Turn to Hostages in Battle Against Foreign Waste*, *Wash. Post*, July 16, 1988, at A19.

As agreed, the Italian government took back the waste. The regional authorities of Emilia Romagna in northern Italy have spent \$43.4 million to date for its treatment and disposal. Of 2,400 tons of waste, 700 tons have been exported to the United Kingdom, France and Finland. Local Italian private companies have also treated and disposed of 350 tons.⁶

In another incident, a local Guinean firm was paid \$40 per ton to accept United States incineration ash that would have cost \$1,000 per ton to dispose of in the United States. The Guinean authorities, however, arrested the Norwegian consul general for his role as a middleman, and threatened to hold him as a hostage until Norway retrieved the ash.⁷ Also in Congo, top ranking Congolese officials were arrested for their involvement in two toxic waste-dumping deals, and Guinea-Bissau was offered three times its GNP in return for accepting wastes shipped by private companies in the United States and Europe.⁸

International waste shipments have not been confined to hazardous wastes. In the mid-1980s Germany tried to dump radioactive wastes in China and Sudan,⁹ and succeeded in dumping radioactive wastes in Poland.¹⁰ In 1987, the Transnuklear/Mol scandal, which involved illegal radioactive waste transfers from Germany to the Mol facility in Belgium, shook the nuclear industry in Europe. The supervisory board of Transnuklear, a private company involved in the radioactive waste transfers, was found to have bribed employees of nuclear plants in Germany in order to solicit waste deals. Employees at the Mol reprocessing facility in Belgium were also bribed into accepting high-level radioactive wastes that Mol could not handle. There were also allegations that high-level wastes, which were not appropriate for Mol, were dumped illegally in the North Sea. The wastes returned to Germany after reprocessing contained plutonium and cobalt-60, substances not found in low-level radioactive wastes.¹¹ Five years after the scandal, the German government has been unable to honor its agreement to take the wastes back. German nuclear power plants refuse to take back the wastes because they have already paid for their disposal, and because they do not have appropriate facilities to store them. In return, Belgium has threatened that the failure to

⁶ Karin B Waste Disposal Complete, Haznews, Jan. 1992 (Lexis, Nexis, Omni File).

⁷ Hiltizik, *supra* note 4.

⁸ Marshall, Public Spurs Cleanup: West Europe Has its Fill of Toxic Waste, L.A. Times, Feb. 28, 1989, at 1, col. 1.

⁹ See Perera, China and Sudan Want Germany's Nuclear Waste, New Scientist, Sept. 1985.

¹⁰ Greenpeace Waste Trade Update, Dec. 1989.

¹¹ See Hancher, 1992 and Accountability Gaps: the Transnuklear Scandal: A Case-Study in European Regulation, 53 Modern Law Review, 669, at 670 (1990). See also Kohl Pressed on N-Waste Controversy, Financial Times, Dec. 30, 1987, at 2; Hibbs, Prosecutors Checking Reports of German LLW Dumped at Sea, NuclearFuel, Oct. 31, 1988, at 4 (Lexis, Nexis, Omni File).

retrieve the wastes will jeopardize the cooperation between the two countries on other nuclear issues.¹²

The accumulation of international waste transfers¹³ has convinced governments that international action is needed. The Basel¹⁴ and the Bamako¹⁵ Conventions, therefore, have been adopted, but are unable until now to curb hazardous and radioactive shipments to developing countries. Legal and illegal waste transfers continue unabated.

2. THE 1990S

2.1. *Illegal Transnational Waste Transfers*

In 1992 a scandal involving illegal waste transfers from Germany to France prompted the German environmental Minister to warn against an international network of illegal waste traffickers similar to that involved in illegal arms and drug deals.¹⁶ In another incident, pesticides which are banned in Germany were shipped to Romania and Albania labeled as humanitarian aid,¹⁷ without the consent of these countries' governments.¹⁸ In the case of Romania, Germany decided to take the wastes back. Taking back the wastes and disposing of them will cost around \$3 million,¹⁹ but the government promised to track down the illegal traffickers.²⁰ The Netherlands has also decided to fine a German company \$840,000 for failing to remove 1,700 metric tons of wastes illegally dumped in its territory.²¹ In 1990, after the Transnuklear scandal, Nuklear Cargo & Service company, a subsidiary of the state railway that replaced Transnuklear, organized waste transfers without the necessary authorization and with falsified documentation.²²

¹² MacLachlan, *Mol Stuck With German Wastes While Bonn, Brussels Negotiate*, *Nucleonics Week*, Mar. 26, 1992, at 10 (Lexis, Nexis, Omni File).

¹³ For a more detailed account of these transfers, see *Transnational Management*, *supra* note 50, Chapter 1.

¹⁴ See *supra* note 1, Introduction.

¹⁵ See *supra* note 2, Introduction.

¹⁶ See Eisenhammer, *Criminals "Trading in Toxic Waste," The Independent*, Aug. 19, 1992, at 6 (Lexis, Nexis, Omni File); *Alarming Spread of Illegal Waste Dumping*, *Agence France Press*, Aug. 19, 1992 (Lexis, Nexis, Omni File); *Catterall, Crime in Germany Spreads to Trash*, *Calgary Herald*, Aug. 22, 1992, at C12 (Lexis, Nexis, Omni File).

¹⁷ *Federal, State Environmental Ministers Approve Steps to Curb Illegal Waste Trade*, *BNA International Environment Daily*, Sept. 28, 1992 (Lexis, Nexis, Omni File).

¹⁸ *Percival, Greenpeace Finds Loopholes in EC Waste Trade Laws*, *Inter Press Service*, Oct. 19, 1992 (Lexis, Nexis, Omni File).

¹⁹ *Environment Minister Vows Hazardous Waste Illegally Dumped in Romania Will Be Sent Back*, *BNA International Environment Daily*, Apr. 30, 1993 (Lexis, Nexis, Omni File).

²⁰ *Peel, Bonn Accepts Return of its Toxic Waste*, *Financial Times*, Mar. 2, 1993, at 2.

²¹ *Dutch Ministry Accuses German Firm of Illegal Movement of Waste, Threatens Fine*, *BNA International Environment Daily*, Jan. 7, 1992 (Lexis, Nexis, Omni File).

²² *Nuclear Energy: West Germany Confirms Irregularities in Transport of Nuclear Material*, *European Report*, Jan. 17, 1990 (Lexis, Nexis, Omni File).

A stringent German waste packaging law has also fueled illegal waste exports because of the absence of German recycling infrastructure.²³ German wastes supposedly destined for recycling have been discovered – often mixed with toxic wastes – as close as France²⁴ and Ukraine and as far away as Indonesia.²⁵ Germany, however, has refused to repatriate these wastes, claiming that the repatriation of wastes transferred to Romania was “an exception.”²⁶ The repeated illegal waste exports from Germany provide a vivid illustration of the thesis of this study that aggressive advancement of sound waste management does not necessarily lead to recycling and waste minimization. When there is no management infrastructure and waste management is unduly expensive, stringent environmental legislation is bound to create illegal waste trafficking. Indeed, Germany is considered one of the most environmentally conscious Member States of the European Community. This, however, has not prevented it from exporting its pollution to other Community countries and abroad. And it is not the only European country engaging in illegal trafficking. By the end of 1992, the Executive Director of UNEP cautioned that organized crime was involved in waste transfers from Italy and Switzerland to Somalia. The interim government of Somalia concluded the deal in hope of making profits to buy more weapons. When the deal was uncovered, the directors of the company involved had already disappeared.²⁷

Japan illegally exports wastes to developing countries in Southeast Asia and primarily to Indonesia.²⁸ China has been accused of dumping toxic and nuclear wastes in Tibet.²⁹ Singapore illegally dumps toxic wastes in Malaysia. In one such incident the Malaysian firm claimed that the imported wastes were soap powder from Singapore.³⁰ Singaporean firms also illegally export wastes

²³ See Germany to Jail Illegal Waste Exporters Up to Ten Years, The Reuter Library Report, July 18, 1993 (Lexis, Nexis, Omni File); Packaging Waste: Recovery Loses Out to Eco-Tax Option, European Report, June 24, 1993 (Lexis, Nexis, Omni File); Rubbish: Green Behind the Ears, Economist, July 3, 1993, at 46 (Lexis, Nexis, Omni File).

²⁴ 230 Tonnes of German Toxic Waste Dumped Illegally in Ukraine, Agence France Press, May 25, 1993 (Lexis, Nexis, Omni File).

²⁵ European Report, *supra* note 23.

²⁶ See *supra* note 24.

²⁷ See Contract to Dump Toxic Waste in Somalia Linked to Firm in Small Village Outside Geneva, BNA International Environment Daily, Oct. 2, 1992 (Lexis, Nexis, Omni File); Somalia: European Firms Dumping Toxic Wastes, UNEP to Probe, Inter Press Service, Sept. 10, 1992 (Lexis, Nexis, Omni File); Hartley, Contract Shows Plan to Dump Toxic Waste in Somalia, The Reuter Library Report, Sept. 7, 1992 (Lexis, Nexis, Omni File). The Italian and Swiss companies were planning to export wastes to Somalia for the next twenty years. See Illegal Waste Exports to Somalia?, Haznews, Dec. 1992 (Lexis, Nexis, Omni File).

²⁸ Japan: Tokyo to Sign Toxic Wastes Dumping Treaty, Inter Press Service, June 10, 1992 (Lexis, Nexis, Omni File).

²⁹ Exiles Claim China Turning Occupied Tibet into Nuclear Dump, United Press International 1992, Oct. 26, 1992 (Lexis, Nexis, Omni File).

³⁰ Singapore's Toxic Wastes Dumped Illegally in Malaysia, The Reuter Library Report, Dec. 30, 1991 (Lexis, Nexis, Omni File). See also Arasu, Toxic Waste Threatens Malaysian Environment, The Reuter Library Report, Jan. 15, 1992 (Lexis, Nexis, Omni File).

to Indonesia. As a result, the two countries have established a hot line and an information exchange program that would enable them to detect illegal waste movements.³¹

In the United States four companies have been charged with illegally exporting over 3,000 tons of hazardous wastes to Bangladesh and Australia.³² Two people were also found guilty of illegally exporting wastes to Pakistan.³³ Central and Latin America, and principally Mexico,³⁴ have been easy targets of the United States illegal waste traffickers.³⁵ Colombia, for instance, was alarmed by rumors that a ship carrying toxic wastes, labeled as scrap metal, would attempt to illegally dispose of the wastes in its territory. According to the Health Ministry, which received the warning from Nigeria, the ship contained also radioactive wastes from a New York based firm. Colombia's constitution prohibits toxic and nuclear waste importation.³⁶ In another incident, a shipment of radioactive wastes from a Florida firm to Honduras disappeared from the docks in Honduras, and was most probably illegally dumped.³⁷ Because of numerous such incidents, Central American countries have signed an agreement that bans waste transfers to and through their region.³⁸

Many times, however, illegal waste imports are brought about by unscrupulous businesses in developing countries. According to an advertisement of a Nigerian firm, wastes transferred from Europe to Nigeria will be disguised as edible oil and transported in small vessels in order to defuse international attention. Apparently, to make such a scheme workable, the firm

³¹ Indonesia, S'pore Discuss Hazardous Waste Disposal, *The Straits Times*, Oct. 18, 1992, at 15 (Lexis, Nexis, Omni File).

³² US Firms Charged with Illegal Export of Hazwastes, *Haznews*, Aug. 1992 (Lexis, Nexis, Omni File).

³³ Weinstein, 2 Found Guilty of Exporting Toxic Waste, *L.A. Times*, April 16, 1993, at B3, col. 5 (the cost of disposing of these wastes in Pakistan was only \$1,800. It would have cost \$80,000 to dispose of these wastes in the United States).

³⁴ See Two Men are Indicted in Mexico Dumping, *N.Y. Times*, May 11, 1990, at B6, col. 6. See also Hazardous Wastes from US-Owned Plants in Mexico Dumped Illegally, Panel Told, *BNA, Daily Report for Executives*, November 22, 1991, at A-22; RSR May Face Criminal Charges Over Mexico Dump, *United Press International* 1992, Nov. 1, 1992 (Lexis, Nexis, Omni File); Abrahamson, Firm Admits Guilt in Toxic Shipment, *L.A. Times*, Dec. 3, 1992, at B1, col. 2.

³⁵ Scott, Central American Presidents Seek a Regional Solution to Toxic Waste Imports, *The Christian Science Monitor*, Mar. 10, 1992, at 5 (Lexis, Nexis, Omni File).

³⁶ See Reports of Ship Carrying Toxic Wastes Cause Government to Closely Guard Ports, *BNA International Environment Daily*, Aug. 20, 1992 (Lexis, Nexis, Omni File); Colombia: Government Bans Ship Loaded with Toxic Waste, *Inter Press Service*, July 30, 1992 (Lexis, Nexis, Omni File).

³⁷ See Scott, *supra* note 35.

³⁸ The agreement is modeled after the Bamako Convention, but is less comprehensive than the Bamako Convention. See *Acuerdo Regional Sobre Movimiento Transfronterizo de Desechos Peligrosos*, Panama, Dec. 11, 1992 (unpublished).

must have been able to form a network of private companies, custom officers, port and military authorities ready to bend the law.³⁹

The disarmament of Eastern Europe has also spurred radioactive material transfers from Eastern European countries to Germany. The Polish police have identified thirty-five attempts to smuggle radioactive materials into Germany.⁴⁰ It is certain that many more similar incidents go undetected because most border crossings in Poland are not effectively supervised.⁴¹ Fortunately, none of these incidents involved quantities of radioactive material adequate to build nuclear weapons. A Polish citizen, however, has offered German undercover officers contacts to obtain a nuclear warhead.⁴² German intelligence agents speculate that former Soviet agents and high-ranking officials are organizing a criminal network for nuclear material transfers.⁴³ Poland also is still utilized by Western companies as a dumping ground for radioactive wastes.⁴⁴

Finally, wastes that cannot be disposed of illegally on land are dumped in the seas. For example, an Estonian ship carrying toxic wastes, despite its close supervision by Turkish and Bulgarian authorities, is believed to have dumped wastes in the Black Sea.⁴⁵ United States prosecutors have charged the executive director of the company that owned the ship "Khian Sea" with instructing the crew to dump 11,000 tons of incineration ash into the Atlantic and Indian oceans. Khian Sea is the ship that made headlines between 1986 and 1988 for being refused permission to unload its hazardous cargo at many ports around the world.⁴⁶ These and other incidents of illegal ocean dumping⁴⁷ are evidence that restrictions and prohibitions do not eliminate pollution, but just shift contamination from land to sea and vice-versa.

³⁹ See E.C. Exposes Illegal Nigerian Waste-Trafficking Racket, Agence France Press, Nov. 4, 1992 (Lexis, Nexis, Omni File); Love, Commission Exposes Nigerian Waste Trader, The Reuter European Community Report, Nov. 4, 1992 (Lexis, Nexis, Omni File). Despite incidents like this one, the Commonwealth Council in collaboration with the Royal Society of Chemistry in London has chosen Nigeria as a model country in Africa in waste management. See Nigeria: Setting the Standard for Hazwaste Disposal, Greenwire, Jan. 14, 1992 (Lexis, Nexis, Omni File).

⁴⁰ Radioactive Waste Smuggling on the Rise, Polish News Bulletin, Nov. 3, 1992 (Lexis, Nexis, Omni File).

⁴¹ *Id.*

⁴² Edwards, National Public Radio, Oct. 19, 1992 (Lexis, Nexis, Omni File).

⁴³ *Id.*

⁴⁴ Radioactive Waste Smuggling on the Rise, Polish News Bulletin, Nov. 3, 1992 (Lexis, Nexis, Omni File).

⁴⁵ See Bulgarian Warship to Search for Waste Ship, The Reuter Library Report, June 17, 1992 (Lexis, Nexis, Omni File); Missing Waste Ship Found Near Turkey, The Reuter Library Report, June 23, 1992 (Lexis, Nexis, Omni File); Turkey on Alert for Missing Ship with Toxic Cargo, The Reuter Library Report, June 26, 1992 (Lexis, Nexis, Omni File); Ship Disappears with Wastes on the Black Sea, Haznews, July 1992 (Lexis, Nexis, Omni File).

⁴⁶ U.S. Businessman Charged in Ocean Dumping of Ash, Toronto Star, Feb. 1, 1993, at C4.

⁴⁷ For example, Russia's ocean dumping of radioactive wastes in violation of the London Dumping Convention. See *supra* note 13, Chapter 1.

2.2. Legal Transnational Waste Transfers

Not all hazardous waste transfers are illegal. Some countries consent to waste transfers because they consider them beneficial. Six thousand metric tons of old tires, paint, sludge and grease have been transferred from Germany to Estonia as humanitarian aid. The wastes will be used, instead of fuel, in an oil fired plant with the consent of the Estonian government.⁴⁸ A United States company has also offered Albania \$500 million over a five-year period, if Albania agrees to import 850,000 tons per year of European and United States wastes for incineration at a power plant.⁴⁹

Poland also is contemplating the adoption of legislation that would allow waste imports for recycling. The current Polish prohibition of hazardous waste imports seems to have diverted wastes away from Poland to other countries such as Romania, Bulgaria and the Baltic states. According to environmental groups, allowing waste imports into Poland for recycling will essentially boost waste dumping since Poland does not have the capacity to assess whether the imported wastes are really for recycling.⁵⁰

Between 1989 and 1992, Greenpeace has listed forty-five official proposals to dispose of wastes in Central and Latin America. Philippines and Hong-Kong actually import waste plastics containing toxics from the United States and use them to make toys. Hong-Kong receives \$30 million for accepting such shipments.⁵¹ A joint venture of an Australian and a Singaporean firm has proposed investing \$350 million in building a hazardous waste plant in Vietnam. The technology that will be applied has been refined in a pilot plant in Singapore. The Vietnamese plant will treat 120,000 tons of waste a year. One hundred thousand tons will come from Korea, Taiwan, Hong-Kong and Japan, and only 20,000 tons will originate from Vietnamese industries. The plant will be operated during the first four to five years by private enterprises, and then will be handed over to the government.⁵² The enterprises involved in the project have tried to convince the Vietnamese government to accept the deal by presenting it as an intelligent way for Vietnam to treat its own wastes, and profit from other countries' wastes.

A United States company also plans to export petroleum contaminated oil to the Marshall islands from Hawaiian service stations. The Marshall islands believe that the shipments will solve their perennial shortage of building materials. The company will pay for all transportation and treatment costs,

⁴⁸ See *supra* note 17.

⁴⁹ See *supra* note 18.

⁵⁰ Poland Threatened with Waste Invasion, Polish News Bulletin, Aug. 28, 1992 (Lexis, Nexis, Omni File).

⁵¹ Hong-Kong: Toxic Toys Made from Poison Plastics, Greenwire, Sept. 2, 1992 (Lexis, Nexis, Omni File).

⁵² Cua, Bonvests Offers US \$350m Toxic Waste Plan to Viets, Business Times, Aug. 1, 1992, at 1 (Lexis, Nexis, Omni File).

and other expenses estimated to be more than \$1 million.⁵³ The Marshall islands are also still considering importing tires to make artificial reefs, and building an incineration facility on the island of Kabua.⁵⁴ Another project, involving the importation of municipal wastes that would build up the islands and prevent their elimination from global warming, seems to have been canceled. This is because the company involved has disappeared, much to the disappointment of the Marshallese government.⁵⁵

Developed countries also frequently engage in waste shipments among themselves which have become the target of public opposition in the importing countries. Exports of Swiss wastes to France and Britain have caused public outcry in the importing countries which have put pressure on Switzerland to build its own waste management facilities. Switzerland exports significant amounts of wastes to Germany, France and Britain, and smaller amounts to other European countries. Portugal has sought to return a Swiss waste shipment after discovering that the Portuguese company which was supposed to treat the wastes did not possess recycling facilities. For the time being, the wastes remain in Portugal until a settlement is reached between the Portuguese and Swiss authorities on their treatment and disposal. The Portuguese government claims that the shipment was authorized in 1988 because of the absence of pertinent legislation in Portugal. Under Swiss law, however, waste exported cannot be returned to Switzerland after more than four years since exportation.⁵⁶ Despite the public opposition in the importing countries and incidents of environmentally unsound waste transfers, it is dubious whether Switzerland will be able to curtail waste exports. The public in Switzerland is strongly opposed to the construction of waste management facilities.⁵⁷ Australia, which exports wastes to France, faces similar problems because of the domestic opposition to the construction of disposal and incineration facilities.⁵⁸ The lack of indigenous disposal facilities has also caused extensive illegal waste disposal.⁵⁹

Certain countries have used their disposal capacity to extract financial concessions from exporting countries. The government of Krasnoyarsk Territory

⁵³ Wagner, Marshall Islands to Get Contaminated Hawaiian Soil, Gannett News Service, Nov. 12, 1992 (Lexis, Nexis, Omni File).

⁵⁴ McIlroy, Third World's Wannable Wastelands The Marshall Islands, The Toronto Star, May 30, 1992, at C6 (Lexis, Nexis, Omni File).

⁵⁵ *Id.*

⁵⁶ Swiss Waste Exports Continue to Rise, Haznews, Dec. 1992 (Lexis, Nexis, Omni File).

⁵⁷ Swiss Need to Step Up Program to Build Waste Disposal Units, Federal Official Says, BNA International Environment Daily, Aug. 27, 1992 (Lexis, Nexis, Omni File).

⁵⁸ France refused initially to accept the wastes carried by an Australian ship. Finally, however, the French government allowed the waste import in order to enable a private company to honor its contract with the Australian firm. *See* Gourlay, Residents Sniff at Britain's Toxic Waste Ban, Inter Press Service, June 10, 1992 (Lexis, Nexis, Omni File); Australia Rejects High-Temperature Waste Incinerator, Agence France Press, Nov. 8, 1992 (Lexis, Nexis, Omni File).

⁵⁹ Drive for Waste Minimization by Victoria's EPA, Haznews, Jan. 1992 (Lexis, Nexis, Omni File).

in Siberia, for example, has stated that it would not accept radioactive wastes from Ukraine for final disposal because of Ukraine's refusal to supply it with consumer goods. It is considering, instead, a South Korean offer of a million dollars for each ton of radioactive waste imported. The 94,000 rubles offered by Ukraine pale in comparison with the Korean offer.⁶⁰

Radioactive waste deals have, other times, been considered suspicious by third countries because of the links between radioactive wastes and nuclear weapons. The United States, for example, has pressured Taiwan not to dispose of its nuclear wastes in China because of a fear that China may use them for the construction of nuclear weapons. Taiwan and China, however, have already identified the disposal sites, and have strong incentives to proceed with the transaction: Taiwan has limited disposal capacity left, and China hopes to earn foreign exchange.⁶¹

⁶⁰ Tarasov, *Siberians Refuse to Accept Waste From Ukrainian Nuclear Power Stations*, Russian Press Digest, Jan. 11, 1992 (Lexis, Nexis, Omni File).

⁶¹ Sharma, *Asia: U.S. Nuclear Fear Spill Over Taipei-Beijing Waste Deal*, Inter Press Service, July 13, 1992 (Lexis, Nexis, Omni File).

CHAPTER 5

Developing National Standards and Liability Rules: The United States Legislation

The purpose of this Chapter is to analyze the United States waste legislation. The United States is a major waste producer and exporter, and elements of its legislation have been instructive for the prescription of the proposed international system for waste transfers. The merits of this legislation from the perspective of minimum standards/transnational waste management will be examined in Chapter 7.

1. RCRA: A POLICY WITHOUT ORIENTATION

1.1. *Definitions and Permits*

RCRA¹ is the first statute to establish federal authority over the regulation of hazardous wastes.² RCRA regulates hazardous wastes, but not abandoned waste sites. The clean-up of abandoned waste sites is regulated by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).³ There is some overlap, however, between provisions of RCRA that mandate clean-up of active waste facilities and CERCLA.⁴

RCRA delineates the goals of the United States policy, and sets waste minimization as the primary goal. Achieving waste minimization, however, is not mandatory. The statute clarifies that the government should not interfere with the production processes of enterprises.⁵ Therefore, if wastes cannot be

¹ 42 U.S.C. §6901 *et seq.* RCRA was adopted in 1978 and amended in 1984.

² Hazardous substances that are not considered hazardous wastes are regulated by other statutes, such as the Toxic Substances Control Act (15 U.S.C. §§2601 *et seq.*, 1976) and the Federal Insecticide, Fungicide and Rodenticide Act (7 U.S.C. §§135 *et seq.*, 1982).

³ For more details on CERCLA, *see infra* Section 6.1.

⁴ *See infra* note 49.

⁵ In the manifest, generators must designate whether they employ a waste minimization program. However, the purpose of this provision is not to render waste minimization mandatory, but to encourage waste minimization. *See* RCRA §3002(b), 42 U.S.C. §6922(b). In order to

DOT's classification of hazardous materials. These three definitions differ and, thus, have created uncertainty in the regulated community. For example, transporters of wastes not regulated under RCRA have to comply with DOT regulations, and CERCLA waste generators have to conform with RCRA standards in order to avoid liability for future clean-ups.²²

RCRA's definition of "solid waste" encompasses any garbage, refuse, sludge, and any other discarded material including liquid, semisolid or gaseous materials resulting from industrial, commercial, mining, agricultural operations or community activities. Nuclear waste, domestic sewage,²³ and industrial discharges regulated under the Clean Water Act are not considered solid wastes for the purposes of RCRA.²⁴ Wastes which are low in toxicity and high in volume are also excluded until EPA conducts studies on the hazards posed by such wastes.²⁵

EPA has elaborated further on the solid waste definition. Solid wastes are discarded materials – materials that are abandoned,²⁶ inherently waste-like,²⁷ or recycled.²⁸ Recycled materials are considered solid wastes if they are recycled in a manner constituting disposal, burned to recover energy, reclaimed,²⁹

²² See *Eagle-Picher Indus. v. EPA*, 759 F.2d 922 (D.C. Cir. 1985) (waste exempt from the definition of "hazardous waste" under RCRA may be a "hazardous substance" under CERCLA).

²³ Congress, aware that one of the most frequent methods of illegal disposal is dumping hazardous wastes in sewers, required EPA to submit a report on hazardous substances that are not regulated because they are mixed with domestic sewage or that pass through the sewer system to publicly owned treatment works (POTWs). Congress decided not to place domestic sewage within the jurisdiction of RCRA because POTWs are regulated by the Clean Water Act. See RCRA §3018, 42 U.S.C. §6939.

²⁴ See 40 C.F.R. 261.4(a)(1)-(5).

²⁵ These wastes include utility wastes, mining wastes, and cement kiln wastes. See RCRA §3001(b)(3)(A), 42 U.S.C. §6921(b)(3)(A); 40 C.F.R. 261.4(b). Congress also authorized EPA to modify the requirements that apply to landfills or surface impoundments accepting such wastes. See RCRA §3004(x), 42 U.S.C. §6924(x). Household wastes are not considered hazardous wastes. See RCRA §3001(i), 42 U.S.C. §6921(i), 40 C.F.R. 261.4(b)(1). Section 40 C.F.R. 261.4(b)(5) specifies that solid wastes associated with exploration, development and production of crude oil, natural gas, or geothermal energy are not hazardous wastes. Some mining wastes and cement kiln wastes are not regarded as hazardous wastes, except if burned in industrial furnaces or boilers. See 40 C.F.R. 261.4(b)(7)-(8). The burning of cement kiln and mining wastes is regulated. See, e.g., 40 C.F.R. 266.112. For a critique of these regulations, see Wilkinson and Hiles, *Bevill Amendment: Burning Hazardous Waste in Cement Kilns*, 55 *Missouri Law Review* 391 (1990); Whisler *et al.*, *supra* note 7.

²⁶ Abandoned materials are materials disposed of, or materials burned or incinerated instead of being disposed of. See 40 C.F.R. 261.2(b).

²⁷ Materials are deemed waste-like, if they are ordinarily disposed of, burned or incinerated, contain toxic constituents not ordinarily found in the raw materials they substitute, or if they may pose a substantial hazard to health and the environment when recycled. See 40 C.F.R. 261.2(d).

²⁸ 40 C.F.R. 261.2(c).

²⁹ "A material is 'reclaimed' if it is processed to recover a usable product, or if it is regenerated. Examples are recovery of lead batteries and regeneration of spent fuels." See 40 C.F.R. 261.1(c)(4).

or accumulated speculatively.³⁰ However, recycled materials are not viewed as wastes if they are used or reused as ingredients in industrial processes to make products, without being reclaimed, if they are used as effective substitutes for commercial products, or as substitutes for raw materials.³¹

A material cannot be characterized as recyclable unless there is a market for it. The existence of a market must be proved by documentation; for example, a contract showing that the material is used in a production process. Recycling facilities must demonstrate that they are sufficiently equipped to perform recycling.³² Wastes will also be characterized as recyclable if during a calendar year at least 75 percent of the waste is recycled.³³

Hazardous waste facilities cannot operate without permits issued by EPA.³⁴ Facilities in existence before the enactment of RCRA³⁵ are called “interim status”³⁶ as long as they have notified EPA about their location, their activities, and the wastes they handle,³⁷ and they have applied for a “part A” permit.³⁸ But the interim status cannot be prolonged forever. It terminates one year after it is granted, unless the owner or operator submits a “part B” permit application³⁹ and certifies compliance with groundwater monitoring

³⁰ Speculative accumulation is defined as accumulation of wastes before recycling. *See* 40 C.F.R. 261.1(c)(8).

³¹ 40 C.F.R. 261.2(e).

³² 40 C.F.R. 261.3(f).

³³ 40 C.F.R. 261.1(c)(8). *See also* RCRA §6002(c)-(i), 42 U.S.C. §6962(c)-(i). RCRA requires government agencies to develop procurement programs in accordance with EPA guidelines. The purpose of these programs is to ensure the purchase of recycled products, especially rubber from tires and recyclable paper, by government agencies. EPA eventually enacted guidelines on how procuring agencies should select among numerous businesses selling recycled paper. *See* 50 Fed. Reg. 14076 (April 9, 1985). In its guidelines regarding tires, EPA stressed the usefulness of rubber extracted from tires for the surfacing of roads or for the construction and rehabilitation of pavements and bridges. *See* 51 Fed. Reg. 6202 (Feb. 20, 1986). For more details on the federal procurement programs, *see* 40 C.F.R. 250, 252, 253.

³⁴ RCRA §3005, 42 U.S.C. §6925. *See also* 40 C.F.R. 270 (describing the permitting process); 40 C.F.R. 264–265 (referring to permitting standards for new and interim status facilities).

³⁵ In order to be considered in existence before the enactment or amendment of RCRA, facilities must have state and local permits by that date, and must have concluded financial commitments that cannot be terminated. *See* Hazardous Waste, *supra* note 19, at 75.

³⁶ RCRA §3005(e), 42 U.S.C. §6925(e). For the specific standards applying to interim status facilities, *see* 40 C.F.R. 265.

³⁷ RCRA §3010(a), 42 U.S.C. §6930(a).

³⁸ Only interim status facilities can apply for a part A permit. For more details on the part A permit application, *see* 40 C.F.R. 270.13.

³⁹ New facilities apply for part B permits. A part B permit application should include generally: a description of the facility, chemical analysis of the wastes to be handled, the traffic pattern, whether the facility is located in a seismic area or in a 100-year floodplain, description of precautions taken to prevent accidents caused by incompatible wastes, and a copy of the closure plan. Additional information is required for specific waste management options, such as incineration or landfilling. For more details on the part B permit application, *see* 40 C.F.R. 270.14–270.26.

and financial responsibility requirements.⁴⁰ Because the requirements for a part B permit application are more stringent, however, many facilities have been unable to demonstrate compliance and have closed down.⁴¹

In addition to permitting requirements, EPA has further prescribed record-keeping, labeling, waste packaging requirements for generators, transporters and disposers.⁴²

Any permit for a new land disposal, treatment, or incineration facility must be for no more than ten years. A ten-year permit facilitates periodic verification of the state-of-the-art technology used in facilities.⁴³ Permits granted after November 8, 1984 must require corrective action for all releases of hazardous wastes at the facility,⁴⁴ regardless of the time of the emplacement of wastes.⁴⁵ The purpose of this provision, called the "mini-Superfund,"⁴⁶ is to render current facility owners responsible for releases of wastes disposed of by previous owners.⁴⁷ Congress decided that it did not make sense to promulgate stringent standards for new units at disposal facilities, while old units were allowed to pollute.⁴⁸ Along the same line, EPA is authorized to issue an order or bring an action against past or present waste generators, transporters and disposers involved in solid or hazardous waste sites that may present an imminent and substantial endangerment to health and the environment.⁴⁹

⁴⁰ RCRA §3005(e)(2)-(3), 42 U.S.C. §6925(e)(2)-(3). See also 40 C.F.R. 270.73. There was also a specific deadline for the termination of the interim status of incineration facilities: November 8, 1989, unless the owner or operator had applied for a part B permit by November 8, 1986. See RCRA §3005(c)(2)(A)(ii) & (C)(i), 42 U.S.C. §6925(c)(2)(A)(ii) & (C)(i), 40 C.F.R. 270.73(f). For other treatment facilities the deadline was November 8, 1992, unless the owner or operator had applied for a part B permit by November 8, 1988. See RCRA §3005(c)(2)(B) - C(ii), 42 U.S.C. §6925(c)(2)(B) - C(ii), 40 C.F.R. 270.73(g).

⁴¹ Hazardous Waste, *supra* note 19, at 204. See also Feder, The Permit Application Process under RCRA - A Lament, 18 Environmental Law 671, at 680 (1988).

⁴² RCRA §§3003-3004, 40 U.S.C. §6922-6924. For more details, see 40 C.F.R. 262.10 *et seq.*; 40 C.F.R. 262.30 *et seq.*; 40 C.F.R. 263.10 *et seq.*; 40 C.F.R. 264.1 *et seq.*; 40 C.F.R. 265.1 *et seq.*

⁴³ Hazardous Waste, *supra* note 19, at 119.

⁴⁴ More specifically, the statute mentions corrective action for all releases of hazardous wastes at "solid waste management units." The term "solid waste management unit" includes any unit at a facility "from which hazardous constituents might migrate, irrespective of whether the units were intended for the management of solid and/or hazardous wastes." See 50 Fed. Reg. 28704, at 28712 (July 15, 1985).

⁴⁵ RCRA §3004(u), 42 U.S.C. §6924(u). See also RCRA §3008(h), 42 U.S.C. §6928(h).

⁴⁶ This provision is called "mini-Superfund" because Superfund is the name of the program that deals with the clean-up of hazardous waste sites. See *infra* Section 6.1.

⁴⁷ 40 C.F.R. 264.101.

⁴⁸ Hazardous Waste, *supra* note 19, at 121. EPA, however, has restricted the scope of the provision by requiring corrective action only for the purposes of protection of human health and the environment. See 50 Fed. Reg. 28704, at 28713 (July 15, 1985).

⁴⁹ RCRA §7003(a), 42 U.S.C. §6973(a). See also *United States v. Waste Indus. Inc.*, 734 F.2d 159, 165 (4th Cir. 1984) (the courts have considered "endangerment" as "imminent," even if the harm may not occur for many years). Also since under CERCLA, EPA can file an action against past waste generators, there was a need to clarify the different functions of RCRA

The process of granting, reviewing and modifying facility permits is cumbersome and time consuming. Permit modifications are required even for minor alterations of facilities.⁵⁰ EPA may review and modify permits any time. Permit renewal must take into account improvements in technology and changes in regulations.⁵¹ Before granting a permit, EPA must inform the public through hearings and notify local governments.⁵² EPA's final decision is subject to administrative appeal and judicial review.⁵³ While the proceedings for granting a permit are pending, interim status facilities may continue to operate, but new, more modern facilities cannot start operations. The permit application process, therefore, has bedeviled the construction of new facilities, and has perpetuated the functioning of old and inefficient ones.

Recognizing that the bureaucracy of permit application will inhibit innovation, Congress authorized EPA to relax the permit regulations for experimental facilities.⁵⁴ Commentators have also recommended the promulgation of separate and less cumbersome regulations for portable treatment units.⁵⁵

1.2. Bans, Variances and the Minimum Technological Requirements

RCRA contains specific requirements for the design and operation of disposal facilities. The amount of detail often gives the impression of administrative regulations and not of legislative provisions. As the legislative history indicates, Congress chose to enact specific provisions, and set deadlines for their implementation, because of the dissatisfaction with EPA's regulatory performance.⁵⁶ The statute contains many absolute prohibitions of waste disposal unless, before a specific deadline, EPA decides that the prohibition is unnecessary for the protection of human health and the environment, and promulgates appropriate standards.

and CERCLA. For this reason, EPA developed a policy according to which, facilities that are subject to RCRA corrective actions are not placed on the National Priority List (NPL). EPA subscribed to this policy because it recognized that the purpose of corrective action under RCRA was to prevent active waste management facilities from becoming burdens on the Superfund program, which should be devoted to abandoned waste sites. However, many times EPA has not respected its own policy: it has subjected RCRA regulated facilities to CERCLA response actions because Superfund allows for more governmental intervention in clean-up activities. See Curry, Hamula and Rallison, *The Tug-of-War between RCRA and CERCLA at Contaminated Hazardous Waste Facilities*, 23 Arizona State Law Journal 359 (1991).

⁵⁰ Regulation, *supra* note 19, at 146–48. Modifications of permits can be classified into two categories – major modifications and minor modifications. See also 40 C.F.R. 270.41–270.42.

⁵¹ RCRA §3005(c)(3), 42 U.S.C. §6925(c)(3).

⁵² RCRA §7004(b), 42 U.S.C. §6974(b). See also 40 C.F.R. 124.10, 124.12, 124.13.

⁵³ 40 C.F.R. 124.19–124.21.

⁵⁴ RCRA §3005(g), 42 U.S.C. §6925(g). These permits can be issued for only one year and can be renewed three times. See RCRA §3005(g)(4), 42 U.S.C. §6925(g)(4).

⁵⁵ Regulation, *supra* note 19, at 152 (often the delays inherent in the permit process have led to increased levels of contamination at land disposal facilities. Contamination would have been avoided, if the portable treatment units were used immediately).

⁵⁶ Hazardous Waste, *supra* note 19, at 86.

For example, landfill disposal of liquid hazardous wastes is absolutely prohibited.⁵⁷ Disposal of liquid wastes in salt dome formations, caves and mines is banned, unless EPA specifies that such disposal will not be detrimental to human health and the environment, promulgates specific standards, and issues permits for those facilities.⁵⁸ Similarly, land disposal of dioxin-containing wastes and certain waste solvents is prohibited unless EPA determines, by a certain deadline, that such prohibition is not required in order to protect human health and the environment. Finally, land disposal of wastes containing specific metals⁵⁹ – the so-called California list wastes⁶⁰ – is banned unless EPA concludes that such prohibition will not affect human health and the environment. California list wastes are also banned from land disposal unless an interested person demonstrates to EPA, to a reasonable degree of certainty, that there will be *no migration* of hazardous constituents for as long as the wastes remain hazardous.⁶¹ Excluded from land disposal hazardous wastes cannot be stored, except when the purpose of storage is the accumulation of hazardous wastes for proper recovery, treatment, or disposal.⁶²

RCRA provided that EPA had to establish a schedule of deadlines, the latest of which was May 8, 1990, pursuant to which it would determine whether other listed hazardous wastes will be excluded from land disposal.⁶³ Similar determinations were to be made for every newly identified hazardous waste.⁶⁴ The criteria for scheduling wastes in order to review their fitness for

⁵⁷ RCRA §3004(c)(1), 42 U.S.C. §6924(c)(1). Disposal of nonhazardous liquid is prohibited, but with exceptions. See RCRA §3004(c)(3), 42 U.S.C. §6924(c)(3).

⁵⁸ RCRA §3004(b), 42 U.S.C. §6924(b). Finally, EPA has prohibited the disposal of liquid wastes in salt dome formations. The only exception is the Department of Energy Waste Isolation Pilot Project (WIPP) in New Mexico which will be used as a repository for nuclear wastes. See 40 C.F.R. 264.18(c). For more details on this project, see *infra* Section 3.

⁵⁹ The metals mentioned in the provision include specific concentrations of arsenic, cadmium, chromium, lead, mercury, nickel, selenium and thallium. See RCRA §3004(d)(2), 42 U.S.C. §6924(d)(2).

⁶⁰ These wastes are called California list wastes because their land disposal was first banned in California.

⁶¹ RCRA §3004(d)(1), 42 U.S.C. §6924(d)(1). See also Bilicic Jr. (Note), An Analysis of the Land Disposal Ban in the 1984 Amendments to Resource Conservation and Recovery Act, 76 Georgetown Law Journal 1563, at 1577 (1990) (in the beginning EPA interpreted the *no migration* standard as a standard allowing migration of hazardous constituents, as long as such migration did not present any threat to human health and the environment. After a strong reaction from Congress and public-interest groups, however, EPA had to withdraw this interpretation in favor of technology-based standards).

⁶² RCRA §3004(j), 42 U.S.C. §6924(j).

⁶³ RCRA §3004(g)(4)(A)-(B), 42 U.S.C. §6924(g)(4)(A)-(B) (pursuant to these deadlines, decisions for the land disposal of one-third of the listed wastes must have been made by August 8, 1988 and decisions for the two thirds of the listed waste must have been made by June 8, 1989). See RCRA §3004(g)(4)(C), 42 U.S.C. §6924(g)(4)(C) (for wastes not evaluated by the above deadlines, decisions must have been made by May 8, 1990).

⁶⁴ RCRA §3004(g)(4), 42 U.S.C. §6924(g)(4).

land disposal were to be based “on their intrinsic hazard and their volume.”⁶⁵ The legislative history, however, indicates that toxicity and volume should not be the only criteria that EPA applies. Other factors that may render unsafe the land disposal of a particular waste must not be ignored.⁶⁶

RCRA provided that if EPA failed to meet the final May 8, 1990 deadline the designated hazardous wastes would be prohibited from land disposal.⁶⁷ But if it missed the previous deadlines, the wastes could still be disposed of in a landfill or a surface impoundment, if such facility met the minimum technological requirements⁶⁸ – two or more liners, a leachate collection system, and groundwater monitoring – and the generator could convince EPA that there was no available treatment for the particular waste.⁶⁹

After enacting the schedule required by the act,⁷⁰ EPA prohibited the land disposal of certain wastes scheduled to be evaluated by the first deadline (the first third rule).⁷¹ After the second deadline, EPA prohibited the land disposal of some wastes scheduled to be evaluated by the first, second, and third deadlines (the second third rule).⁷² Finally, before the third deadline, EPA banned the land disposal of some other wastes that had to be evaluated by the first, second and third deadlines and some newly identified wastes (the third third rule).⁷³ These rules, however, and the regulations promulgated for dioxins, solvents and California list wastes⁷⁴ do not establish absolute land disposal bans. Rather, they permit land disposal after pretreatment.⁷⁵ More specifically, land disposal is permitted, if the regulated hazardous constituent in the waste does not exceed a specified concentration level.⁷⁶ This concentration level is determined by using the TCLP or EP tests.⁷⁷ In addition to concentration-based standards, EPA has promulgated technology-based

⁶⁵ RCRA §3004(g)(2), 42 U.S.C. §6924(g)(2).

⁶⁶ Hazardous Waste, *supra* note 19, at 90.

⁶⁷ RCRA §3004(g)(6)(C), 42 U.S.C. §6924(g)(6)(C).

⁶⁸ *See* RCRA §3004(o), 42 U.S.C. §6924(o).

⁶⁹ RCRA §3004(g)(6)(A)-(B), 42 U.S.C. §6924(g)(6)(A)-(B).

⁷⁰ Section 40 C.F.R. 268.10 lists the wastes that had to be evaluated by the first deadline of August 8, 1988. Section 40 C.F.R. 268.11 lists the wastes that had to be evaluated by the second deadline of June 8, 1989. Section 40 C.F.R. 268.12 lists the wastes that had to be evaluated by the third deadline of May 8, 1990.

⁷¹ 53 Fed. Reg. 31138 (Aug. 17, 1988). *See also* 40 C.F.R. 268.33.

⁷² 54 Fed. Reg. 26594 (June 23, 1989). *See also* 40 C.F.R. 268.34.

⁷³ 55 Fed. Reg. 22520 (June 1, 1990). *See also* 40 C.F.R. 268.35.

⁷⁴ *See* 40 C.F.R. 268.30–268.32.

⁷⁵ EPA’s decision to allow land disposal of wastes after treatment is based on a statutory provision. Section 3004(m) of RCRA, 42 U.S.C. §6924(m) provides that EPA can, simultaneously with the bans on land disposal, prescribe treatment methods that will significantly diminish the toxicity of the waste and the likelihood of migration of hazardous constituents from the waste and, thus, minimize the threats to human health and the environment.

⁷⁶ 40 C.F.R. 268.30–268.41.

⁷⁷ For more details under which circumstances each method should apply, *see* 56 Fed. Reg. 3864, at 3865–66 (Jan. 31, 1991).

standards mandating the use of the best demonstrated available technology (BDAT).⁷⁸

The land disposal prohibitions are further compromised by nationwide variances – extension of deadlines – for two years after the date of prohibition, until “adequate alternative treatment, recovery, or disposal capacity become available.”⁷⁹ Individual variances may also be granted, if the applicant demonstrates that there is a binding contractual commitment to construct a facility, or verifies that alternative treatment is not possible by the deadline because of circumstances beyond her control.⁸⁰ Facilities that obtain variances must, however, comply with the minimum technological requirements.⁸¹

EPA has issued national variances for almost all land disposal prohibitions it has promulgated.⁸² EPA has also made possible the granting of individual variances when a concentration standard cannot be achieved, or there is no BDAT appropriate for the particular waste.⁸³ To obtain such a variance, the applicant must demonstrate that her waste differs significantly from wastes analyzed in developing the concentration, or technology standards, and that it cannot be treated in a manner that would achieve those standards.⁸⁴ Exemptions from land disposal prohibitions can also be granted when the applicant demonstrates, “to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the disposal unit ... as long as the wastes remain hazardous.”⁸⁵

New landfills⁸⁶ and surface impoundments must meet the minimum technological requirements, which consist, as mentioned above, of double liners, leachate collection systems, and groundwater monitoring.⁸⁷ These requirements also apply to expansions of existing landfills or surface impoundments with respect to waste received after May 8, 1985,⁸⁸ and to surface impoundments in existence before the 1984 RCRA amendments.⁸⁹ Landfills in exis-

⁷⁸ 40 C.F.R. 268.43. For a description of the specific technologies, *see* 40 C.F.R. 268.42. *See also* 55 Fed. Reg. 22520, at 22525–26 (June 1, 1990).

⁷⁹ RCRA §3004(h)(2), 42 U.S.C. §6924(h)(2).

⁸⁰ RCRA §3004(h)(3), 42 U.S.C. §6924(h)(3).

⁸¹ RCRA §3004(h)(4), 42 U.S.C. §6924(h)(4).

⁸² *See, e.g.*, 40 C.F.R. 268.31(c), 268.32(f), 268.33(f), 268.34(e), and 268.35(f), (g) & (h).

⁸³ 40 C.F.R. 268.44.

⁸⁴ *Id.*

⁸⁵ 40 C.F.R. 268.6.

⁸⁶ New landfills are those for which permit applications have not been received by November 8, 1984 or for which permits are to be issued after November 8, 1984. *See* 50 Fed. Reg. 28708 (July 15, 1985).

⁸⁷ RCRA §3004(o), 42 U.S.C. §6924 (o).

⁸⁸ RCRA §3015(b), 42 U.S.C. §6936(b).

⁸⁹ Surface impoundments had to comply with minimum technological requirements by November 8, 1988. Otherwise, they would have not been allowed to dispose of hazardous wastes. *See* RCRA §3005(j)(1), 42 U.S.C. §6925(j)(1). Not all surface impoundments are subject to the new technological requirements. There are many exceptions; for example, when the surface impoundment has at least one liner that is not leaking, is located more than one-quarter mile from an underground source of drinking water and is in compliance

tence before the 1984 amendments, however, are not required to comply with the technological requirements, since incorporating a new technological device, such as a leachate collection system, into an existing landfill may cause more environmental harm than it would repair.⁹⁰ Minimum technological requirements are not applicable, if the owner or operator of a facility demonstrates "that alternative designs and operating practices, together with location characteristics" can prevent the migration of hazardous constituents at least as effectively as liners and leachate collection systems.⁹¹ It would be difficult, however, to demonstrate that minimum technological requirements are unnecessary, since the natural properties of disposal locations alone cannot usually prevent groundwater contamination.⁹²

Groundwater monitoring is also required at all facilities.⁹³ For facilities with already contaminated groundwater sources, EPA must specify the concentration limits that hazardous constituents must not exceed.⁹⁴

1.3. Other Provisions and Enforcement

RCRA specifies that hazardous waste incinerators must meet the 99.99 percent DRE standard established by EPA on June 24, 1982.⁹⁵ By converting the 1982 regulation into a legislative provision, Congress prevented EPA from

with groundwater monitoring requirements for permitted facilities. See RCRA §3005(j)(2), 42 U.S.C. §6925(j)(2). For other exceptions, see RCRA §3005(j)(3), 42 U.S.C. §6925(j)(3); RCRA §3005(j)(7)(C), 42 U.S.C. §6925(j)(7)(C); RCRA §3005(j)(4), 42 U.S.C. §6925(j)(4); RCRA §3005(j)(8), 42 U.S.C. §6925(j)(8); RCRA §3005(j)(13), 42 U.S.C. §6925(j)(13). An application for an exception must include an application for a permit, evidence of compliance with groundwater monitoring, and all reasonably ascertainable evidence that the impoundment is not leaking. This information must be certified by a registered professional engineer. See RCRA §3005(j)(5), 42 U.S.C. §6925(j)(5).

⁹⁰ Hazardous Waste, *supra* note 19, at 111.

⁹¹ RCRA §3004(o)(2), 42 U.S.C. §6924(o)(2).

⁹² Hazardous Waste, *supra* note 19, at 102.

⁹³ Groundwater monitoring is necessary, independent of whether the facility is situated above the seasonal high water table, has two liners and a leachate collection system or is subject to inspection by the disposer. See RCRA §3004(p), 42 U.S.C. §6924(p). This provision applies retroactively. See RCRA §3005(i), 42 U.S.C. §6925(i). Groundwater monitoring is not necessary when disposal facilities do not pose any potential for migration of liquids (40 C.F.R. 264.90(b)), and when it is demonstrated that no hazardous constituents have migrated beyond the treatment zone during the active life of the facility (42 C.F.R. 264.280(e)).

⁹⁴ 40 C.F.R. 264.92. Yet specific standards are established only for a limited number of constituents. See 40 C.F.R. 264.94(a)(2). Standards for other hazardous constituents in the groundwater are designated on a case-by-case basis in each individual permit. The concentration limits of hazardous constituents designated in the permit must not exceed the background level of those constituents in the groundwater. See 40 C.F.R. 264.94(a)(1). EPA may also establish alternate concentration limits by taking into account factors, such as the chemical and physical characteristics of the waste, the hydrogeological characteristics of the facility, the potential health risks and the potential damage to vegetation and wildlife. See 40 C.F.R. 264.94(b).

⁹⁵ RCRA §3004(o)(1)(B), 42 U.S.C. §6924(o)(1)(B). For more details, see 40 C.F.R. 264.343. For industrial furnaces, see 40 C.F.R. 266.104.

abandoning the standard, and opting for incineration standards based on a cost-risk analysis.⁹⁶ EPA had already determined that the 99.99 percent DRE requirement could be realistically achieved.⁹⁷ The incineration standards are performance standards – they do not provide details on the construction of incineration facilities, but on their performance.

In 1980, EPA decided to exempt “small quantity generators” – generators producing less than 1,000 kilograms of hazardous wastes a month – from hazardous waste regulations because it did not have the resources to regulate such generators.⁹⁸ However, because of the extensive illegal disposal by small generators, Congress decided to increase the number of regulated small generators. RCRA defines small quantity generators as generators producing more than 100 and less than 1,000 kilograms of hazardous wastes per month.⁹⁹ EPA regulations for small quantity generators may differ from the general regulations, but they must be protective of human health and the environment.¹⁰⁰

Small quantity generators must comply with most of the regulations for large quantity generators.¹⁰¹ For example, they must determine whether their wastes are hazardous,¹⁰² obtain an EPA identification number,¹⁰³ assign waste shipments to a transporter with an EPA identification number,¹⁰⁴ use the manifest system,¹⁰⁵ keep copies of manifests for three years,¹⁰⁶ and comply with DOT regulations when shipping wastes offsite. Small quantity generators,

⁹⁶ Hazardous Waste, *supra* note 19, 105.

⁹⁷ See Reitze and Davis, *Reconsidering Ocean Incineration as Part of a U.S. Hazardous Waste Management Program: Separating the Rhetoric from the Reality*, 17 Boston College Environmental Affairs Law Review 687, at 705 (1990).

⁹⁸ 45 Fed. Reg. 76620 (Nov. 19, 1980).

⁹⁹ RCRA §3001(d)(1), 42 U.S.C. §6921(d)(1). Congress has also authorized EPA to regulate generators that produce less than 100 kilograms of hazardous wastes per month. *See* RCRA §3001(d)(4), 42 U.S.C. §6921(d)(4).

¹⁰⁰ RCRA §3001(d)(2), 42 U.S.C. §6921(d)(2). Small quantity generators can store their hazardous wastes onsite without a permit for a period of 180 days as long as the quantity of wastes generated is less than 1,000 kilograms a month. The period of storage is extended to 270 days, if the generator has to ship the waste more than 200 miles and the total stored waste does not exceed 6,000 kilograms. *See* RCRA §3001(d)(6), 42 U.S.C. §6921(d)(6). The longest large quantity generators can store their hazardous wastes is 90 days. If they store their wastes for more than 90 days, they are treated as disposers. *See* 40 C.F.R. 264.1(g)(3), 40 C.F.R. 262.34(a).

¹⁰¹ 40 C.F.R. 262.44.

¹⁰² 40 C.F.R. 262.11.

¹⁰³ 40 C.F.R. 262.12.

¹⁰⁴ *Id.*

¹⁰⁵ RCRA §3001(d)(3), 42 U.S.C. §6921(d)(3). The manifest system is a system that helps to regulate hazardous waste transfers. For more details on the manifest system, *see infra* Section 2.1.

¹⁰⁶ 40 C.F.R. 262.40. *See infra* Section 2.1.

however, are not required to keep many burdensome records¹⁰⁷ and file exception reports.¹⁰⁸

Specific environmental problems related to haphazard waste disposal and sham recycling inspired RCRA provisions for hazardous waste fuel,¹⁰⁹ recycled oil and underground storage tanks.¹¹⁰

The regulation of recyclable oil confronted EPA with a difficult dilemma. Recyclable oil may be hazardous and deserves to be regulated. On the other hand, listing recycled oil as hazardous waste could discourage recycling.¹¹¹ Waste generators and recycling facilities may turn away from recycling because of the liability associated with the name "hazardous." And the absence of licensed recycling facilities will eventually induce illegal disposal.¹¹² For these reasons, EPA decided not to list recyclable oil as hazardous waste.¹¹³ Generators and transporters of used oil do not have to comply with RCRA regulatory requirements, provided that the used oil is recycled at a facility with a valid permit, or at the premises of a generator with a permit to recycle used oil.¹¹⁴ This exemption does not apply if the generator mixes used oil with other hazardous wastes, or does not keep records including agreements on delivery of used oil to recycling facilities.¹¹⁵

¹⁰⁷ 40 C.F.R. 262.40(b).

¹⁰⁸ Generators must submit exception reports to the EPA if they have not received a copy of the transportation document – manifest – signed by the disposer within forty-five days from the date the waste was accepted by the transporter. *See* 40 C.F.R. 262.42(b).

¹⁰⁹ RCRA §3004(q) 42 U.S.C. §6924(q). *See also* RCRA §3010, 42 U.S.C. §6930.

¹¹⁰ The recurrent leaks and contamination resulting from mismanaging underground storage tanks spurred a series of provisions under RCRA. *See* Hazardous Waste, *supra* note 19, at 230–31. These provisions define "underground storage tank" as a tank or combination of tanks which contains regulated substances and which is 10 percent or more under the ground. *See* RCRA §9001(1), 42 U.S.C. §6991(1). The owners of such tanks have to notify the authorities about the age, size, type, location of the tanks, and the type and quantity of substances contained in the tanks. *See* RCRA §9002(a)(2)(B), 42 U.S.C. §6991a(a)(2)(B). EPA must promulgate regulations regarding the maintenance of leak detection systems, and issue reports on releases, the corrective action undertaken, closure and financial responsibility requirements. *See* RCRA §9003(c), 42 U.S.C. §6991b(c). EPA has enacted such regulations. *See* 40 C.F.R. 280 *et seq.* In addition, RCRA provides that after 1985 no tank should be installed that is unable to prevent releases due to corrosion or structural failure. Non-corrosive material compatible with the substance stored should be used for the construction of tanks. *See* RCRA §9003(g), 42 U.S.C. §6991b(g). Owners or operators of tanks are required to provide any information concerning the tank, allow inspections at reasonable times, and monitor the tanks, their contents, and their surrounding environment. *See* RCRA §9005(a), 42 U.S.C. §6991d(a). The regulations of underground storage tanks have particularly affected federal facilities. The Department of Defense has more than 40,000 underground storage tanks. *See* Hazardous Waste, *supra* note 19, at 237.

¹¹¹ The tension between environmental protection and the need to encourage recycling of used oil is obvious in the language of RCRA. *See* RCRA §3014(a), 42 U.S.C. §6935(a).

¹¹² Hazardous Waste, *supra* note 19, at 172–75.

¹¹³ *See* 40 C.F.R. 261.6(a)(3)(v–viii).

¹¹⁴ RCRA §3014(c)(2)(B)(i), 42 U.S.C. §6935(c)(2)(B)(i).

¹¹⁵ RCRA §3014(c)(2)(B)(ii)–(iii), 42 U.S.C. §6935(c)(2)(B)(ii)–(iii).

The enforcement mechanisms at EPA's disposal range from administrative orders to civil and criminal penalties. EPA can issue a compliance order or start a civil action as soon as it discovers a violation.¹¹⁶ In the event of an imminent hazard from present or past waste mishandling, EPA may seek injunctive relief or issue an administrative order.¹¹⁷ When a facility poses a substantial hazard to human health or the environment, EPA may issue an order requiring the owner or operator of the facility to conduct monitoring, testing, or other analysis. Failure to comply with the order could bring an EPA action.¹¹⁸ Generally, administrative penalties involve fines up to \$25,000 for each day of non-compliance and permit suspension or revocation.¹¹⁹ EPA has established a civil penalty policy pursuant to which the severity of the penalty depends upon the gravity of the violation, and the magnitude of deviation from the RCRA regulations. Penalties are adjusted by taking into account the economic benefits of non-compliance, good faith, negligence, willfulness, history of non-compliance, and other unique circumstances.¹²⁰

Criminal penalties are imposed when a person knowingly handles hazardous wastes without a permit, knowingly violates the permit conditions, or the regulations for interim status facilities.¹²¹ In addition, the generator commits a crime when she causes hazardous waste transportation to an unlicensed facility, falsifies, destroys, alters, conceals or fails to file documents, such as manifests or other reports.¹²² Waste transportation without the appropriate documentation, and exportation without the importing country's consent, or in violation of a bilateral treaty are prosecuted as crimes.¹²³ Finally, it is not only criminal to cause actual harm, but also to knowingly place "another person in imminent danger of death or serious bodily injury" by mishandling hazardous waste.¹²⁴

Criminal enforcement is carried out by the Environmental Crimes Unit of the Justice Department and the EPA's criminal investigators. States have also established criminal task forces.¹²⁵ Inspections are an essential part of the enforcement. EPA is authorized to start a program of mandatory inspections that will take place at least every two years.¹²⁶ Information resulting

¹¹⁶ RCRA §3008(a), 42 U.S.C. §6928(a).

¹¹⁷ RCRA §7003(a), 42 U.S.C. §6973(a). For the interim status facilities, *see* RCRA §3008(h), 42 U.S.C. §6928(h).

¹¹⁸ RCRA §3013(e), 42 U.S.C. §6934(e).

¹¹⁹ RCRA §3008(a)(3), 42 U.S.C. §6928(a)(3).

¹²⁰ Regulation, *supra* note 19, at 323-24.

¹²¹ RCRA §3008(d)(2), 42 U.S.C. §6928(d)(2).

¹²² RCRA §3008(d)(1), (3)-(4), 42 U.S.C. §6928(d)(1), (3)-(4).

¹²³ RCRA §3008(d)(5)-(6), 42 U.S.C. §6928(d)(5)-(6).

¹²⁴ The maximum fine for such violation is \$250,000, and the maximum prison sentence is fifteen years. "A defendant that is an organization shall, upon conviction of violating this subsection, be subject to a fine of not more than 1,000,000." *See* RCRA §3008(e), 42 U.S.C. §6928(e).

¹²⁵ Regulation, *supra* note 19, at 326.

¹²⁶ RCRA §3007(e), 42 U.S.C. §6927(e).

from inspections of federal and state facilities must be made available to the public.¹²⁷

After giving sixty-day notice,¹²⁸ citizens have the right to sue any entity – including the state or federal government – that violates the act. However, citizens cannot bring an action under the imminent and substantial endangerment provision, when the government is diligently prosecuting an enforcement action, or when the polluter is engaging in a CERCLA clean-up.¹²⁹

Despite these significant enforcement mechanisms, RCRA has not so far been vigorously enforced. Monitoring has also been inadequate because of the large number of waste generators and disposers, and the lack of training of inspectors.¹³⁰ Even though the exact extent of illegal waste trafficking is unknown,¹³¹ it does not seem that it has subsided – not only because of the reluctance of industries to conform with regulations,¹³² but also because of the involvement of organized crime.¹³³ The manifest system has been frequently unhelpful in detecting illegal waste traffickers, thus enforcement agencies have mostly relied on tips from former employees, business rivals or other concerned citizens.¹³⁴

¹²⁷ RCRA §3007(c)-(d), 42 U.S.C. §6927(c)-(d).

¹²⁸ RCRA §7002, 42 U.S.C. §6972. In *Hallstrom v. Tillamook County*, 110 S.Ct. 304 (1989), the United States Supreme Court held that the sixty-day notice and delay requirement is mandatory for a citizen bringing an action under the act, and failure to comply with it requires dismissal of the action.

¹²⁹ RCRA §7002(b)(2)(B), 42 U.S.C. §6972(b)(2)(B).

¹³⁰ For methods to improve enforcement and monitoring, see P.P. Portney, R.C. Dower, A.M. Freeman III, C.S. Russell and M. Shapiro, *Public Policies for Environmental Protection* 266–70 (1990).

¹³¹ Measuring and Deterring, *supra* note 9, Chapter 1.

¹³² A corporation in the United States agreed to pay \$63.8 million to settle criminal charges that it illegally disposed of wastes onsite. See *Ciba-Geigy to Spend \$64 Million to Settle a Dumping Suit*, United Press International 1992, Feb. 28, 1992 (Lexis, Nexis, Omni File). Another enterprise decided to appeal a \$2.5 million fine imposed for dumping waste at its former plant. See *Firm Appeals Fine for Toxic Waste Dumping*, United Press International 1992; Sept. 23, 1992 (Lexis, Nexis, Omni File). In another incident, a corporation was found guilty of involuntary manslaughter, illegal waste transportation and illegal water pollution. See *Firm Found Guilty in Fatal Explosion*, United Press International 1992, Oct. 5, 1992 (Lexis, Nexis, Omni File). See also EPA, *States Issue Cluster Actions Against Operators Under RCRA*, BNA Daily Report for Executives, Feb. 5, 1992, at A-12 (Lexis, Nexis, Omni File). (“EPA and ten states announced filing 46 civil actions and 5 criminal actions assessing over \$20 million in penalties against generators and transporters of hazardous waste, as well as facility owners and operators that have disregarded notification requirements under the Resource Conservation and Recovery Act.”); EPA *Seeks Maximum Fines in 24 Cases Alleging Violations of RCRA, Other Laws*, BNA, Daily Report for Executives, July 19, 1993 (Lexis, Nexis, Omni File). For illegal waste exports, see generally Chapter 4. Small waste generators and transporters have been frequently involved in illegal waste disposal. See generally S.I. Schwartz and W.B. Pratt, *Hazardous Waste from Small Generators: Strategies and Solutions for Business and Government* 3 (1990). See also Measuring and Deterring, *supra* note 131, at 39.

¹³³ See Hinchey, *supra* note 9, Chapter 1.

¹³⁴ See Measuring and Deterring, *supra* note 131, at 25.

States are authorized to promulgate their own RCRA programs according to the EPA's guidelines.¹³⁵ These programs can be more stringent than the federal program.¹³⁶ But EPA can withdraw authorization of a state program which fails to comply with the federal guidelines.¹³⁷ Also states must compile, publish and submit to EPA an inventory of hazardous waste sites including their location, address, and the type of hazardous wastes they treat or dispose of.¹³⁸

2. HMTA: THE FAILURE TO LINK HAZARDOUS AND RADIOACTIVE WASTE TRANSFERS

There is no exclusive legislation for the transportation of hazardous and radioactive wastes. Most legislation and regulations for the transportation of hazardous and radioactive materials apply also to hazardous and radioactive wastes. In certain circumstances waste transportation entails additional requirements.¹³⁹

2.1. *The Need for a Unified Manifest*

EPA regulates hazardous waste transportation with the manifest system which is supposed to provide "cradle-to-grave" monitoring of hazardous wastes.¹⁴⁰ The manifest contains, *inter alia*, the name of the disposal facility to which the wastes are to be transported,¹⁴¹ and consists of four copies: one copy is for the generator to keep, one for the transporter,¹⁴² and one for the disposer.¹⁴³ The disposer, after receiving the wastes, has to send a copy of the manifest back to the generator.¹⁴⁴ In this fashion, the generator verifies the actual receipt of the wastes by the disposer. If the generator does not receive a copy of the manifest within thirty-five days after handing the wastes over to the transporter, she must determine the fate of the wastes by contacting the transporter and disposer. The generator must also inform the EPA by filing an exception report.¹⁴⁵ Many times, however, manifests have been falsified

¹³⁵ RCRA §3006(a)-(b), 42 U.S.C. §6926(a)-(b). EPA cannot approve a program inconsistent with the federal or other state programs, and lacking adequate enforcement.

¹³⁶ RCRA §3009, 42 U.S.C. §6929.

¹³⁷ RCRA §3006(e); *See also* 42 U.S.C. §6926(e).

¹³⁸ RCRA §3012, 42 U.S.C. §6933.

¹³⁹ In this Section, the term "materials" includes wastes unless it is otherwise specified.

¹⁴⁰ RCRA §3002(5), 42 U.S.C. §6922(5).

¹⁴¹ 40 C.F.R. 262.20.

¹⁴² Waste transporters are considered owners or operators of disposal facilities, if they store the waste at a transfer facility more than ten days. *See* 40 C.F.R. 263.12. They are considered waste generators, if they mix hazardous wastes of different DOT shipping descriptions by placing them into a single container. *See* 40 C.F.R. 263.10(c)(2).

¹⁴³ 40 C.F.R. 262.22.

¹⁴⁴ *Id.*

¹⁴⁵ 40 C.F.R. 262.42.

by hazardous waste transporters who dump the waste illegally and keep the disposal fee.¹⁴⁶

Low-Level radioactive waste shipments must also be accompanied by a manifest. But the manifest for low-level wastes is not as standardized as the hazardous waste manifest.¹⁴⁷ Any shipping papers are adequate provided they include a waste description, the name and address of the generator, and are in compliance with DOE's, EPA's, or the receiver's requirements.¹⁴⁸ Transporters who already have an EPA hazardous waste identification number must include it in the low-level radioactive waste manifest.¹⁴⁹ Manifests must also be filed by waste collectors handling prepackaged wastes, and waste processors who treat or repackage wastes.¹⁵⁰ Waste collectors and processors are required to complete a manifest because they frequently aggregate in a shipment wastes of many generators.¹⁵¹ The NRC has recently concluded that low-level waste manifests contain insufficient information, and has proposed the establishment of a national uniform low-level radioactive waste manifest. The proposed manifest would identify the waste generator, even if it is issued by collectors, and would include more specific information about the wastes and their containers.¹⁵²

Hazardous waste exports are possible only after the prior notification and informed consent of the receiving country, or in accordance with a bilateral treaty between the United States and the importing country.¹⁵³ The prior notification and informed consent requirement is in harmony with the Basel Convention. Overall, however, the United States regulations are less stringent than the Basel requirements. The prior informed consent of transit countries is not required and there is no obligation of the United States government or the exporter to take back the wastes in the event of a breakdown of the system of prior notification. The United States prior notification procedure covers a smaller number of wastes than the Basel Convention – which also encompasses household wastes¹⁵⁴ – and the European Community Regulation.¹⁵⁵ Hazardous waste exporters are required to file an annual report with EPA summarizing the type, quantities, frequency, and ultimate destination of hazardous wastes exported during the previous year.¹⁵⁶ There are no specific rules for radioactive waste exports. The existing rules for radioactive materi-

¹⁴⁶ See *Illegal Disposal*, *supra* note 9, at 27, Chapter 1.

¹⁴⁷ Compare 10 C.F.R. 20.311(b) with 40 C.F.R. 262.20(a).

¹⁴⁸ *Id.*

¹⁴⁹ Compare 10 C.F.R. 20.311(b) with 40 C.F.R. 263.11.

¹⁵⁰ 10 C.F.R. 20.311(e)-(f).

¹⁵¹ 57 Fed. Reg. 14500 (April 21, 1992).

¹⁵² *Id.* The manifest should include the identification of each disposal container, the identification of waste, the gross weight of the waste including the disposal container, and the maximum radiation levels at the surface of each container. *Id.*

¹⁵³ RCRA §3017(a), 42 U.S.C. §6938(a).

¹⁵⁴ See *supra* note 136, Chapter 2.

¹⁵⁵ See Chapter 6, Section 2.2.2.2.

¹⁵⁶ RCRA §3017(g), 42 U.S.C. §6938(g).

al exports apply also to radioactive wastes.¹⁵⁷ These rules do not provide for prior notification and informed consent of the importing country as the IAEA guidelines do.¹⁵⁸

The responsible agencies for waste transfers have yet to develop a unified manifest for both hazardous and radioactive wastes. Such a manifest could be an expansion of the existing hazardous waste manifest, and would make mandatory EPA identification numbers for generators and transporters of low-level radioactive wastes. Such a manifest would also be ideal for the transportation of mixed wastes that present both radioactive and hazardous properties.

2.2. Regulatory Overlap and Specification Standards

EPA is not the only agency that regulates hazardous material transfers. DOT has a significant share of responsibility as well.¹⁵⁹ In order to avoid overlapping of responsibilities, DOT and EPA have issued a Memorandum of Understanding.¹⁶⁰ The Memorandum, however, does not clearly divide the responsibilities between the two agencies. Moreover, apart from DOT and EPA, another three agencies have authority to regulate radioactive material transfers: NRC, DOE, and the Department of Defense (DOD). DOT and NRC have issued a Memorandum of Understanding under which NRC is responsible for the transportation of high-level radioactive material and DOT for the transportation of less radioactive material.¹⁶¹ DOE and DOD regulate the transportation of radioactive material because they ship their own radioactive wastes.¹⁶² DOE is also generally responsible for the management of high-level radioactive wastes and would be responsible for its transportation to the final repository.¹⁶³

DOT's responsibility to regulate hazardous materials derives from the Hazardous Materials Transportation Act (HMTA).¹⁶⁴ The act authorizes DOT to designate materials as hazardous, if their transportation may pose an unreasonable risk to health and safety or property. The materials regulated include

¹⁵⁷ 10 C.F.R. 110. These rules require that exporters of radioactive materials obtain licenses from NRC. For exports of byproduct material, *see* 10 C.F.R. 110.23. *See also* 10 C.F.R. 110.28 for embargoed destinations.

¹⁵⁸ *See* Chapter 2, Section 2.1.

¹⁵⁹ *See* RCRA §3003, 42 U.S.C. §6923.

¹⁶⁰ Memorandum of Understanding between DOT and EPA, 45 Fed. Reg. 51645 (Aug. 4, 1980).

¹⁶¹ Memorandum of Understanding between DOT and EPA, 44 Fed. Reg. 38690 (July 2, 1979).

¹⁶² 49 C.F.R. 173.7(b). Shipments of radioactive material by DOD or DOE and "which are escorted by personnel specifically designated by or under the authority of those agencies, for the purpose of national security" are not subject to DOT regulations. However, the packaging of radioactive materials by DOE should be in accordance with the regulations of NRC. *See* 49 C.F.R. 173.7(d).

¹⁶³ *See infra* Section 3.

¹⁶⁴ 49 U.S.C. §1801 *et seq.* The act was adopted in 1975 and amended in 1990.

substances such as explosives, radioactive materials, flammable liquids and solids, or corrosive materials.¹⁶⁵

DOT has classified hazardous materials¹⁶⁶ in a table that indicates their hazard, identification number, labels, and UN packing group, and contains special requirements for air, rail and truck transportation.¹⁶⁷ If a material is not listed in the Hazardous Materials Table, the transporter should examine whether the material belongs to a certain hazard class – whether it is a corrosive, explosive, flammable, radioactive, infectious substance or other regulated material (ORM-D).¹⁶⁸ The proper shipping name for hazardous wastes must include the word “waste.”¹⁶⁹ The hazardous waste manifest must also include DOT’s description of the hazardous material.¹⁷⁰

The international shipments of hazardous materials are facilitated by the inclusion of the UN packing group in DOT’s classification. The United States follows also the technical instructions issued by ICAO,¹⁷¹ and permits transfers within its territory of materials packaged, labeled, marked and placarded in accordance with the IMDG Code.¹⁷² The incorporation of international codes into the United States regulatory system is illustrative of their success in regulating the transportation of dangerous goods, and could be predictive of the success of an international code for waste management.

DOT has also promulgated packing, handling, labeling and marking regulations.¹⁷³ Packagings should be designed and constructed so that there is no identifiable release of hazardous material into the environment. The design of the packaging must not compromise its effectiveness.¹⁷⁴ The packaging should also be compatible with its content so as to avoid undesirable chemical reactions.¹⁷⁵ In addition to these general requirements, there exist numerous specific requirements for different types of packagings,¹⁷⁶ and specific regulations for hazardous wastes. For example, hazardous wastes do not have to be transported in closed head drums, even when hazardous materials have to,

¹⁶⁵ HMTA §104, 49 U.S.C. §1803.

¹⁶⁶ 49 U.S.C. 1804(a)(4)(B)(i).

¹⁶⁷ 49 C.F.R. 172.101.

¹⁶⁸ 49 C.F.R. 173.2.

¹⁶⁹ 49 C.F.R. 172.101(c)(9).

¹⁷⁰ 49 C.F.R. 172.205. Hazardous materials that are not RCRA hazardous wastes are accompanied by shipping papers. The difference between shipping papers and manifests is that manifests include the EPA identification numbers of generators, transporters and disposers.

¹⁷¹ 40 C.F.R. 171.11. For more details on ICAO’s technical instructions, *see* Chapter 2, Section 3.

¹⁷² 49 C.F.R. 171.12. For more details, *see* Chapter 2, Section 3.

¹⁷³ 49 U.S.C. §1804(a)(4)(B)(ii).

¹⁷⁴ 49 C.F.R. 173.24a(2).

¹⁷⁵ 49 C.F.R. 173.24(e). Plastic packaging should pass a test called “Procedure for Testing Chemical Compatibility and Rate of Permeation in Plastic Packagings and Receptacles.” *See* 49 C.F.R. 173.24(e)(3)(ii). Limited quantities of hazardous material are not subject to packaging requirements. *See* 49 C.F.R. 173.4.

¹⁷⁶ 49 C.F.R. 178–179.

if this is impracticable and an equivalent open head drum exists.¹⁷⁷ Under certain circumstances also, previously used packagings may be reused for hazardous waste transportation without being subject to reconditioning and reuse provisions.¹⁷⁸

DOT's packaging requirements have been criticized as too specific and confusing.¹⁷⁹ Too specific regulations do not leave room for flexibility and innovation.¹⁸⁰ While the detailed packaging requirements¹⁸¹ have contributed to the uniformity of packagings,¹⁸² they have also increased the number of applications for exemptions. DOT may grant exemptions for two years, if a person demonstrates, by conducting a safety analysis prescribed by DOT, that it can transport the material in a manner achieving or exceeding the level of safety required by DOT.¹⁸³ The process of granting exemptions is very time-consuming. DOT handles one hundred exemptions a month, most of them renewals, or applications to become parties to existing exemptions. This creates a bureaucracy that would have been unnecessary, if the packaging requirements were more flexible.¹⁸⁴ For this reason, it has been suggested that DOT should abandon the so-called "specification standards," and adopt the performance standards endorsed by UN and other international institutions.¹⁸⁵

The packaging of high-level radioactive materials is the responsibility of NRC. High-level radioactive materials need very secure Type B packages designed to withstand severe accidents.¹⁸⁶ Less radioactive material are packaged in Type A packages designed to withstand normal accidents.¹⁸⁷ The radiation on the surface of both type A and B packagings must not exceed certain maximum levels.¹⁸⁸ Type A packages and labeling and placarding of all radioactive materials are DOT's responsibility. DOT, in fact, has specified

¹⁷⁷ 49 C.F.R. 173.12(a).

¹⁷⁸ 49 C.F.R. 173.12(c).

¹⁷⁹ See, e.g., Marten, Regulation of the Transportation of Hazardous Materials: A Critique and a Proposal, 5 Harvard Environmental Law Review 345 (1981).

¹⁸⁰ *Id.* at 367.

¹⁸¹ 49 C.F.R. 178-179.

¹⁸² Transportation, *supra* note 64, at 134, Chapter 1.

¹⁸³ 49 U.S.C. §1806(a).

¹⁸⁴ Transportation, *supra* note 182, at 134.

¹⁸⁵ *Id.* at 134-35. See also Chapter 2, Section 3.

¹⁸⁶ Type B packagings are subject to thorough testing, such as dropping, puncture, exposure to heat, and water immersion, in order to examine whether they can withstand severe accidents. For more details, see 10 C.F.R. 71.73. The international testing regulations for packagings are more stringent. See *supra* note 189, Chapter 2.

¹⁸⁷ Type A packagings are subject to testing in order to verify whether they can withstand normal accidents. See 10 C.F.R. 71.71. For more detailed information on Type A packages, see 49 C.F.R. 173.412. See also 49 C.F.R. 173.425 for transportation requirements for low specific activity (LSA) radioactive materials, that is materials presenting very low radioactive hazard. These materials "must be packaged in strong, tight packages so that there will be no leakage of radioactive material under conditions normally incident to transportation." Wooden boxes, 55 gallon drums, and special tank trailers usually fulfill these requirements.

¹⁸⁸ 10 C.F.R. 71.47. The level of removable (non-fixed) contamination on the external surface of each package should be as low as reasonably achievable. See 10 C.F.R. 71.87.

the labels that should accompany each category of hazardous and radioactive material.¹⁸⁹ Some materials are exempt from labeling, such as low specific activity (LSA) radioactive material.¹⁹⁰ Materials belonging to more than one hazard class may require multiple labels.¹⁹¹ Placarding¹⁹² is the responsibility of both the shipper and carrier. DOT has developed tables indicating the appropriate placards for different hazardous and radioactive materials.¹⁹³ EPA has specified that the marking of hazardous wastes in non-bulk packagings should include the name of the generator, the document number of the manifest, and specify that federal law prohibits improper waste disposal.¹⁹⁴ The marking of other types of hazardous waste packages, however, must follow DOT's requirements.¹⁹⁵

2.3. Interstate Movements of Hazardous Materials

The transportation of dangerous materials has created great controversy. The transportation of radioactive material in passenger aircrafts has been prohibited¹⁹⁶ – unless the materials are used in medical diagnosis or treatment – because of incidents of radioactive contamination. The truck and rail transportation of hazardous and radioactive materials has also stirred public opposition because of the fear of accidents and overall exposure due to such transportation. In fact, some states and localities have tried to ban transportation of hazardous and radioactive substances through their territories. In response to the public anxiety, DOT has issued regulations regarding the routing of hazardous and radioactive cargoes.¹⁹⁷ For example, it provides

¹⁸⁹ For the table of labels, see 49 C.F.R. 172.411.

¹⁹⁰ 49 C.F.R. 172.400a.

¹⁹¹ 49 C.F.R. 172.406(c).

¹⁹² Placards are symbols placed on each side and end of motor vehicles, railcars, and freight containers to indicate the hazard of the transported material. See 49 C.F.R. 172.504(a).

¹⁹³ 49 C.F.R. 172.521–560. When two or more categories of hazardous materials are transported, a “Dangerous” placard may substitute specific placards if the cargo is less than 5,000 pounds. See 49 C.F.R. 172.504(b). Infectious material, hazardous material classified as ORM-D, and limited quantities of hazardous material are exempt from placarding. See 49 C.F.R. 172.500.

¹⁹⁴ 49 C.F.R. 172.301(a)(2). See also 40 C.F.R. 262.32(b). The non-bulk packaging of hazardous material should be marked with the proper shipping name and identification number. See 49 C.F.R. 172.301(a). There are also marking requirements for bulk packagings (49 C.F.R. 172.302); liquid hazardous material (49 C.F.R. 172.312); portable tanks (49 C.F.R. 176.326); and cargo tanks (49 C.F.R. 172.328).

¹⁹⁵ 40 C.F.R. 262.32(a).

¹⁹⁶ 49 U.S.C. §1807(a)(B). However, the term “radioactive material” does not include materials, “which the Secretary determines [are] of such low order of radioactivity that when transported [do] not pose a significant hazard to health and safety.” *Id.* In addition, there are restrictions on the quantity of hazardous material that can be transported by aircraft (49 C.F.R. 175.75), and requirements to inform the pilot about the hazardous material carried on an aircraft (49 C.F.R. 175.33).

¹⁹⁷ There are also specific regulations concerning measures to be taken during accidents. These measures depend on whether transported materials are corrosive, flammable, explosive,

that transporters of hazardous materials should avoid heavily populated areas, places where crowds are assembled, tunnels, narrow streets or alleys unless no practicable alternative route exists.¹⁹⁸ In addition, for certain kinds of explosives, written routing plans, which should not cause unnecessary delays, are required.¹⁹⁹ States and municipalities are allowed to regulate hazardous material transfers through tunnels for mass transport.²⁰⁰

For the transportation of radioactive material, DOT provides that all placarded shipments of radioactive material should operate on routes that minimize radiological risk.²⁰¹ The routing of high-level radioactive material is subject to more stringent requirements: a preferred route should be chosen that is either the interstate highway system or an alternative route as designated by the affected state in accordance with the DOT guidelines.²⁰² The physical protection of spent fuel is subject, additionally, to NRC regulations.²⁰³

The HMTA and the DOT regulations have preempted state and local regulations regarding hazardous material transportation. For example, state and local permits, route justifications, and emergency planning requirements for nuclear material transportation have been held inconsistent with federal regulations.²⁰⁴ Permit requirements for other hazardous materials and written accident notice have been held incompatible with federal regulations when they would cause "unnecessary delay." But oral accident notice and other common sense requirements, such as inspection of vehicles after loading and unloading, have been held consistent with federal law.²⁰⁵

or radioactive. *See* 49 C.F.R. 177.854-861. There are also specific requirements for railway transport (49 C.F.R. 174), air transport (49 C.F.R. 175), and water transport (49 C.F.R. 176). It is also provided that hazardous material packages must be loaded and securely blocked and braced to prevent the packages from changing position, falling to the floor, or sliding into each other after shocks normally occurring during transportation. *See* 49 C.F.R. 174.55(b); 49 C.F.R. 174.61, 174.63, 174.67. The bulk carriage of hazardous material by water is regulated by the United States Coast Guard. *See* 46 C.F.R. 148, 46 C.F.R. 150-154.

¹⁹⁸ 49 C.F.R. 397.9(a).

¹⁹⁹ 49 C.F.R. 397.9(b); 49 C.F.R. 177.853. For railway transportation, hazardous material must be shipped forty-eight hours after its receipt by the transporter. *See* 49 C.F.R. 174.14.

²⁰⁰ 49 C.F.R. 177.810.

²⁰¹ 49 C.F.R. 177.825(a).

²⁰² 49 C.F.R. 177.825(b). This rule is referred to as HM-164, reprinted in 46 Fed. Reg. 5298 (Jan. 19, 1981). It was amended by HM-169, reprinted in 48 Fed. Reg. 10218 (Mar. 10, 1983).

²⁰³ 49 C.F.R. 177.825(e). Among the safeguards to be followed when spent fuel is transported are: notification to NRC, development of a communications center that will monitor the progress of spent fuel shipment, arrangements with local enforcement agencies along the route of transport in order to guarantee their immediate response in case of an emergency, and armed escorts. *See* 10 C.F.R. 73.37.

²⁰⁴ *See, e.g.,* DOT Inconsistency Ruling (IR-8), 49 Fed. Reg. 46637 (Nov. 27, 1984); DOT Inconsistency Ruling (IR-15), 49 Fed. Reg. 46660 (Nov. 27, 1984).

²⁰⁵ *See, e.g.,* New Hampshire Motor Transport Association v. Flynn, 751 F.2d 43 (1st Cir. 1984); National Tank Truck Carriers, Inc., v. Burke, 698 F.2d 559 (1st Cir. 1983); National Tank Truck Carriers, Inc., v. New York, 677 F.2d 270 (2nd Cir. 1982); New York v. Ritter, 515 F. Supp. 663 (S.D.N.Y. 1981); Atchison, T. & S. F. R. Co., v. Illinois Commerce Com., 453 F. Supp. 920 (N.D. Ill. 1977).

2.4. *The Lack of Enforcement*

The public fear of hazardous and nuclear material transportation, while not totally justified,²⁰⁶ is not unfounded.

DOT is authorized by the HMTA to maintain a central reporting system and data center so as to provide enforcement authorities and fire-fighting personnel with information in cases of an emergency.²⁰⁷ DOT also has to prepare an annual report on hazardous material transportation. This report must include information on the number of accidents, regulations and exemptions, an evaluation of the enforcement activities, a summary of the problems encountered and recommendations for their solution.²⁰⁸ Accordingly, DOT has required that each incident during transportation, loading, unloading, and temporary storage, involving unintentional release of hazardous materials or hazardous wastes, should be reported within thirty days.²⁰⁹ In case of release of hazardous wastes, the report must be attached to the manifest and include an estimate of the quantity of wastes removed, the name and address of the facility to which they were taken, and the manner of their disposal.²¹⁰ In case of a serious accident, DOT or the Coast Guard must be notified "at the earliest practicable moment."²¹¹ Immediate notification of NRC is also required for serious incidents involving radioactive material.²¹² Overexposures and excessive levels and concentrations of radioactive materials must be reported to NRC within thirty days after an accident.²¹³ Any person handling radioactive material must report to NRC by telephone, immediately after discovering a loss or theft of a licensed material.²¹⁴

²⁰⁶ Transportation, *supra* note 182, at 26 (the public, for example, does not seem to be so apprehensive of gasoline truck accidents even if they are more numerous and cause greater damage). See also Chapter 1, Section 5.2.

²⁰⁷ 49 U.S.C. §1808(d).

²⁰⁸ 49 U.S.C. §1808(e).

²⁰⁹ 40 C.F.R. 171.16. See also 49 C.F.R. 174.45 (rail), 49 C.F.R. 175.45 (air), and 49 C.F.R. 176.48 (marine vessels).

²¹⁰ 49 C.F.R. 171.16.

²¹¹ See 49 C.F.R. 171.15(a). For this purpose, toll-free lines have been established. Serious accidents are defined as accidents that involve injuries requiring hospitalization, deaths, property damages exceeding \$50,000, evacuation, interruption of transportation, fire breakage, spillage or suspected radioactive contamination. *Id.* Transporters can ask for the assistance of CMEMTREC, an emergency center of the Chemical Manufacturers Association. Transportation, *supra* note 182, at 24. A government agency providing emergency assistance is the Federal Emergency Management Agency (FEMA). The agency is responsible for developing programs that support state and local emergency activities. The agency, however, has focused on radiological concerns, and natural disaster planning, and not on hazardous material accidents. In 1985, EPA developed the Chemical Emergency Preparedness Program (CEPP) to assist states and communities in developing emergency programs. See *id.* at 255.

²¹² 10 C.F.R. 20.403.

²¹³ 10 C.F.R. 20.405.

²¹⁴ 10 C.F.R. 20.402.

In reality, however, the reporting system has many deficiencies stemming principally from its voluntary nature.²¹⁵ The DOT Hazardous Materials Information System (HMIS) is based on incomplete accident reporting and inadequate accident analysis.²¹⁶ In addition, DOT has no knowledge of the exact amount of hazardous materials transported²¹⁷ and the number of shippers and carriers²¹⁸ because registration is not mandatory despite the recommendation of the 1975 HMTA.²¹⁹ Hazardous waste generators and transporters, on the other hand, must obtain an EPA identification number²²⁰ so the overall information about hazardous waste transfers is more complete.²²¹ The lack of information about hazardous material carriers, however, is expected to be remedied by the 1990 amendments of the HMTA that now render registration of carriers mandatory.²²²

To enforce HMTA provisions and its own regulations, DOT issues orders of compliance after giving notice and an opportunity for a hearing.²²³ Civil penalties are imposed, after a hearing, on any person who knowingly violates the statute. In determining the amount of the penalty DOT takes into account mitigating factors, such as the history of prior offenses, the ability to pay, or the effect of the penalty on the viability of the enterprise.²²⁴ Criminal penalties are imposed on willful violators.²²⁵ In addition to criminal and civil penalties, DOT may bring an action for equitable relief that may include a claim for punitive damages.²²⁶ Other appropriate measures may be granted by courts, if DOT has reason to believe that an imminent hazard exists.²²⁷

The enforcement of HMTA provisions, however, has been weak. Penalties imposed are frequently very low, and consequently, cannot deter corporations which view them as part of their normal business expenses.²²⁸ Inspections are infrequent.²²⁹ The 1990 expansion of civil and criminal penalties, and

²¹⁵ Transportation, *supra* note 182, at 5.

²¹⁶ *Id.* 7-8.

²¹⁷ *Id.* at 43.

²¹⁸ For this reason, certain states have developed their own registration programs. See Transportation, *supra* note 182, at 20.

²¹⁹ 49 U.S.C. §1805(b).

²²⁰ 40 C.F.R. 262.11; 40 C.F.R. 263.11.

²²¹ Transportation, *supra* note 182, at 45.

²²² 49 U.S.C. §1805(c).

²²³ 49 U.S.C. §1808(a).

²²⁴ 49 U.S.C. §1809(a).

²²⁵ 49 U.S.C. §1809(b).

²²⁶ 49 U.S.C. §1810(a).

²²⁷ "Imminent hazard" is defined as the "existence of a condition which presents substantial likelihood that death, serious illness, severe personal injury, or substantial endangerment to health, property, or the environment may occur before the reasonably foreseeable completion of an administrative hearing or other formal proceeding initiated to abate the risks of those effects." See HMTA §111, 49 U.S.C. §1810(b).

²²⁸ Transportation, *supra* note 182, at 25.

²²⁹ *Id.* at 29.

provisions for inspections²³⁰ and emergency training programs²³¹ attempt to remedy many of the drawbacks of the 1975 legislation. Hopefully, they will be effectively implemented.

3. INTERSTATE WASTE TRADE

Prohibitions and restrictions are not only an international phenomenon. They are prevalent also in domestic arenas. In the United States, certain states and localities have attempted to ban or otherwise control waste imports into their territories claiming that such imports are environmentally unsound. The United States Supreme Court and lower courts, however, have struck down such prohibitions and restrictions as incompatible with the commerce clause of the constitution.²³²

In *City of Philadelphia v. New Jersey*,²³³ the Court held that a New Jersey statute that banned the importation of solid wastes from other states violated the commerce clause of the Constitution. The Court emphasized that "the evil of protectionism can reside in legislative means as well as legislative ends."²³⁴ Therefore, even if the objective of the law was environmental rather than isolationist, a state "may not accomplish [it] by discriminating against articles of commerce coming from outside the [s]tate unless there is some reason, apart from their origin, to treat them differently."²³⁵ The Court's rationale was that the environment and the health of citizens of New Jersey could not be adversely affected by Philadelphia's wastes since New Jersey produced similar waste. It also rejected the lower court's conclusion that because wastes are valueless materials, they cannot be articles of commerce.²³⁶ The Court

²³⁰ 49 U.S.C. §§1813(d)–1814.

²³¹ 40 U.S.C. §§1815–1816.

²³² The commerce clause is called "dormant" because it is not explicitly stated in the constitution. According to the constitution: "[t]he Congress shall have Power ... To regulate Commerce with foreign Nations, and among the several States, and with Indian Tribes" See U.S. CONST., Art. I, §8, cl. 3. The Supreme Court in *Welton v. Missouri*, 91 U.S. 275 (1875) held that uniform commercial legislation is essential in order to protect commerce and that the inaction of the Congress on this matter should be interpreted to mean that interstate commerce is free and uninhibited. This "free-trade" interpretation of the commerce clause has been attacked by academic commentators. See, e.g., Redish and Nugent, *The Dormant Commerce Clause and the Constitutional Balance of Federalism*, 1987 *Duke Law Journal* 569 (1987); Maltz, *How Much Regulation is Too Much – An Examination of Commerce Clause Jurisprudence*, 50 *George Washington Law Review* 47 (1981); Eule, *Laying the Dormant Commerce Clause to Rest*, 91 *Yale Law Journal* 425 (1982).

²³³ 437 U.S. 617 (1978).

²³⁴ *Id.* at 626.

²³⁵ *Id.* at 627.

²³⁶ *Id.* at 622–23.

underlined the notions of economic nationhood, community and interdependence that cautioned against economic isolationism of states.²³⁷ According to the Court, a state may not "isolate itself from a *problem common to many*"²³⁸ by erecting a barrier against the movement of interstate trade."²³⁹

The reasoning of *Philadelphia* has been followed by three lower courts in cases involving bans on industrial,²⁴⁰ nuclear,²⁴¹ and hazardous wastes. The case involving hazardous wastes²⁴² is particularly interesting because Alabama did not ban waste imports outright, but only restricted them. Alabama like Belgium – as we will see below²⁴³ – decided to control waste imports when an increased influx of hazardous wastes into the state raised concerns that Alabama was becoming the "waste dump of the nation."²⁴⁴ Under the Alabama statute, a commercial hazardous waste facility located in Alabama was prohibited from accepting wastes from states with no facilities or states with no special agreement with Alabama.²⁴⁵ Alabama claimed that such conditions were necessary because of the capacity assurance provision²⁴⁶ which requires each state to present, within the next twenty years, a proposal to the EPA showing state capacity to dispose of its waste.

The court held that hazardous wastes were not more dangerous than solid wastes and that as long as there was compliance with regulations, "the dangers associated with hazardous waste movement [did] not outweigh the value of moving wastes across borders."²⁴⁷ The court found that Alabama's import ban only on states with no special agreement with Alabama provided additional evidence that hazardous waste can be subject to interstate transactions.²⁴⁸ The court, citing *Philadelphia* went on to hold that the protection of human health and the environment did not justify discrimination against articles of commerce coming from another state solely because of their origin.

²³⁷ *Id.* at 623.

²³⁸ Emphasis added.

²³⁹ See *supra* note 233, at 628.

²⁴⁰ *Hardage v. Atkins*, 582 F. 2d 1264 (10th Cir. 1978).

²⁴¹ In *Washington State Building & Construction Trades Council v. Spellman*, 684 F. 2d 627 (9th Cir. 1982) the court held that only agreements or "compacts" approved by the federal government have the authority to ban low-level radioactive waste imports. For more details on low-level radioactive waste legislation, see *infra* Section 5. For a critique of the inability of single states to halt waste movements into their territory, see Conrad (Note), *Glowing Their Own Way: State Embargoes and Exclusive Waste-Disposal Sites Under the Low-Level Radioactive Waste Policy Act of 1980*, 53 *George Washington Law Review* 654 (1985).

²⁴² *National Solid Wastes Management Association v. Alabama*, 910 F. 2d 713 (11th Cir. 1990). For a critique of the decision, see Jenkins (Note), *Constitutionally Mandated Southern Hospitality*, 69 *North Carolina Law Review* 1001 (1991).

²⁴³ See Chapter 6, Section 2.1.

²⁴⁴ See *Alabama*, *supra* note 242, at 717, n. 6.

²⁴⁵ *Id.* at 717.

²⁴⁶ 42 U.S.C. §9604(c)(9)(B).

²⁴⁷ *Alabama*, *supra* note 242, at 718.

²⁴⁸ *Id.* at 719.

With respect to the capacity assurance provision, the court stated that it did not authorize states to regulate commerce. The court reasoned that if Congress wished to allow states to regulate commerce – so that all states comply with the capacity assurance requirement – it would have explicitly said so.²⁴⁹

Finally, the court struck down Alabama's pre-approval requirements. The pre-approval regulations resembled the Basel prior notification and informed consent procedure and required both in-state and out-of-state generators to apply for state approval sixty days before the hazardous waste shipment to a state disposal facility. Because these regulations applied evenhandedly to local and out-of-state generators, the court applied the *Pike*²⁵⁰ balancing test:

Where the statute regulates even-handedly to effectuate a legitimate local public interest, and its effects on interstate commerce are only incidental, it will be upheld unless the burden imposed on such commerce is clearly excessive in relation to the putative local benefits.²⁵¹

The court concluded that the pre-approval requirements “imposed substantial economic burdens on both intrastate and interstate commerce” that were not outweighed by the achieved local benefit.²⁵² The court explained that waste disposal within ninety days after production, as required by RCRA, would have been jeopardized by the pre-approval regulations that did not set any time restraint for Alabama's response.²⁵³

A more recent Supreme Court case, *Fort Gratiot Landfill v. Michigan Dorr*,²⁵⁴ involved Michigan's waste import restrictions. According to the Michigan statute, waste management was the responsibility of counties. More specifically, every Michigan county had to explicitly authorize, according to its waste management plan, waste imports from another Michigan county, state or country. The Court, following the reasoning of *Philadelphia*, held that states cannot economically isolate themselves from the national economy and avoid the application of the commerce clause “by curtailing the movement of articles of commerce through subdivisions of the State, rather than through the State itself.”²⁵⁵ It also repeated that wastes are articles of commerce “whether the business arrangements between out-of-state generators of waste and the Michigan operator of a waste disposal site are viewed as ‘sales’ of garbage or ‘purchases’ of transportation and disposal services”²⁵⁶

²⁴⁹ *Id.* at 720.

²⁵⁰ *See Pike v. Bruce Church*, 397 U.S. 137 (1970). For the Supreme Court's jurisprudence before and after the adoption of the *Pike* test, *see* Blasi, *Constitutional Limitations on the Power of States to Regulate the Movement of Goods in Interstate Commerce*, in *I Courts and Free Markets* 174 (Sandalow and Stein eds. 1982).

²⁵¹ *Pike*, *id.* at 142.

²⁵² *Alabama*, *supra* note 242, at 724.

²⁵³ *Id.*

²⁵⁴ 112 S. Ct. 2019 (1992).

²⁵⁵ *Id.*

²⁵⁶ *Id.*

In most cases, therefore, the United States courts did not even apply the *Pike* balancing test. Instead, they rejected the state regulations as facially or intentionally discriminatory of interstate waste trade. As will be emphasized in the next Chapter, the European Court of Justice seems to have adopted a different position regarding waste trade between the Member States of the European Community.

4. NWPA: THE SEARCH FOR A FINAL WASTE REPOSITORY

4.1. *Seeking a Location*

The Nuclear Waste Policy Act (NWPA)²⁵⁷ also is a statute regulating wastes, but it is different from RCRA. While RCRA's objective is to establish standards for hazardous waste disposal, NWPA's goal is to resolve the impasse of locating the final nuclear waste repository. The act, therefore, schedules the siting, construction and operation of radioactive waste²⁵⁸ repository; defines the federal responsibility and policy; and divides the responsibilities between the federal and state governments.²⁵⁹

The act authorizes both NRC and EPA to promulgate standards for the disposal of high-level wastes. DOE is responsible for every aspect of radioactive waste management, but it has to conform with NRC's and EPA's standards²⁶⁰ in order to obtain licenses issued by those agencies for site

²⁵⁷ 42 U.S.C. §10101 *et seq.* The act was adopted in 1982 and amended in 1987.

²⁵⁸ Radioactive waste includes both high-level radioactive waste and spent fuel. High-level radioactive waste is defined as "(A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (B) other highly radioactive material that the Commission [NRC], consistent with existing law, determines by rule requires permanent isolation." See 42 U.S.C. §10101(12). Spent fuel is defined as "fuel that has been withdrawn from a nuclear power reactor following irradiation, the constituent elements of which have not been separated by reprocessing." See 42 U.S.C. §10101(23).

²⁵⁹ NWPA §111(b), 42 U.S.C. §10131(b).

²⁶⁰ DOE has issued general "postclosure" and "preclosure" guidelines (10 C.F.R. 960.4 - 960.5-2-11) in accordance with the standards promulgated by EPA and NRC.

characterization,²⁶¹ construction authorization,²⁶² receipt and management of wastes at the repository and closure of the repository.²⁶³ An application for a license should include general information about the repository and the repository operations,²⁶⁴ and a safety analysis report providing more specific information about the site.²⁶⁵

In addition to the final waste repository, the act contemplates the possibility of constructing, as mentioned in Chapter 3, an MRS facility.²⁶⁶ The purpose of an MRS facility is to provide temporary waste and spent fuel storage. In order to prevent the MRS facility from becoming a *de facto* nuclear waste repository, the facility selection cannot start before the construction authorization of the

²⁶¹ See 42 U.S.C. 10101(21) ("site characterization means (A) siting research activities with respect to a test and evaluation facility at a candidate site; and (B) activities, whether in the laboratory or in the field, undertaken to establish the geologic condition and the ranges of the parameters of a candidate site relevant to the location of a repository, including borings, surface excavations, excavations of exploratory shafts, limited subsurface lateral excavations and borings, and in situ testing needed to evaluate the suitability of a candidate site for the location of a repository, but not including preliminary borings and geophysical testing needed to assess whether site characterization should be undertaken."). See also NWA §113(b), 42 U.S.C. §10133(b) (site characterization should include a general plan for site characterization, a description of the relationship between the waste form or packaging and the geologic conditions of the site, and a conceptual repository design. The general plan should include: first, a description of the site, descriptions of the activities that would be undertaken at the site, such as excavations and plans for onsite testing of radioactive materials, plans for decontamination and decommissioning of the site; and second, criteria that should be used in determining the suitability of the site, such as hydrology, geophysics, seismic activity, and proximity to populations). See also NWA §112(a), 42 U.S.C. §10132(a) (site characterization should also include "the cost and impact of transporting to the repository site the solidified high-level radioactive waste and spent fuel to be disposed of in the repository and the advantages of regional distribution in the siting of the repositories."). For the relevant administrative regulations, see 10 C.F.R. 60.15–60.18.

²⁶² For more details on construction authorization, see NWA §114, 42 U.S.C. §10134. In order to authorize construction, NRC should determine whether the repository will pose a risk to health and safety after taking into account the geologic, geophysical, geochemical, and hydrologic characteristics of the site; the kinds and quantities of radioactive waste to be received; and the principal architectural and engineering criteria. It should also be determined that the repository complies with the performance objectives, does not pose a threat to common defense and security, and that "after weighing the environmental, economic, technical and other benefits against the environmental costs and considering available alternatives" construction authorization is justified. See 10 C.F.R. 60.31.

²⁶³ See also 40 C.F.R. 60.1–60.52.

²⁶⁴ The general information must provide a general description of the repository, the character of the activities to be undertaken, proposed schedules of construction, receipt of wastes, description of the plan that will provide protection against sabotage, and a description of the site characterization work actually conducted. See 10 C.F.R. 60.21.

²⁶⁵ The safety analysis report should include: the geomechanical, hydrogeologic, and geochemical properties of the site, analyses to determine the degree to which favorable and adverse conditions have been taken into account, an evaluation of the performance of the repository after closure, the effectiveness of engineered and natural barriers, an explanation of the models used to perform different assessments, a description of the program for control of occupational radiation exposures, and plans for emergency situations. See 10 C.F.R. 60.21.

²⁶⁶ NWA §141(b)(1), 42 U.S.C. §10161(b)(1).

permanent repository.²⁶⁷ A previous decision to site the MRS facility in Oak Ridge, Tennessee was annulled by the 1987 amendments of the NWP, and DOE must begin the site selection process all over again.²⁶⁸ Congress has also appointed a Commission to study and make recommendations on the utility of an MRS facility.²⁶⁹ The Commission has proposed two MRS facilities. One would be owned by the government, and the other would be funded by high-level waste generators.²⁷⁰ But the Commission's proposal has been opposed by industry.

Another facility occasionally looked upon as a potential repository or MRS facility is WIPP²⁷¹ located in New Mexico.²⁷² The WIPP was initially conceived as a facility for the disposal of defense transuranic wastes,²⁷³ and as a research project examining the safety of underground waste disposal. Given the initial purpose of the facility, therefore, it is doubtful whether it can be used for the permanent disposal of radioactive wastes without congressional action.²⁷⁴ Indeed, it has not yet opened even for the disposal of defense wastes. Congress has recently passed a bill that would enable the opening of the facility.²⁷⁵ Yet public opposition in New Mexico and neighboring states is fierce.²⁷⁶ On the other hand, states that currently store defense wastes have

²⁶⁷ *Id.*

²⁶⁸ NWP §142(a), 42 U.S.C. §10162(a).

²⁶⁹ NWP §143(a)(1)(C), 42 U.S.C. §10163(a)(1)(C).

²⁷⁰ For more details on the Commission's proposition, see Chapter 3, Section 2.4.

²⁷¹ Graham, Payne, Rippon and Zacha, Planning for the '90s - and Beyond, Nuclear News, Jan. 1, 1990, at 82 (Lexis, Nexis, Omni File).

²⁷² See *supra* note 58. Statutory authority for this program was derived from the Department of Energy Organization Act, 42 U.S.C. §7133(a)(8)(1982), the Energy Reorganization Act, 42 U.S.C. §5801 (1974), and the Atomic Energy Act 42 U.S.C. §2011 (1954).

²⁷³ The GAO has estimated the cost of cleaning-up nuclear weapon plants to be more than \$130 billion. WIPP is carved into salt beds and will accept wastes from nuclear weapons plants situated in ten states. Presently nuclear wastes are stored in Rocky Flats, Colorado, Savannah River, South Carolina, and the Idaho National Engineering Laboratory (INEL). INEL is the only facility in the United States that reprocess radioactive wastes. See Flynn, United Press International, June 30, 1989 (LEXIS, Nexis, Omni File); DOE Nuclear Clean Up May Top \$130 Billion; GAO Estimate of Costs is Highest To Date, BNA, Daily Report for Executives, July 14, 1988 (Lexis, Nexis, Omni File); Hickox, Congress Moves to Resolve WIPP Differences, States News Service, July 30, 1992, (Lexis, Nexis, Omni File); Andrus Receptive to DOE's INEL Plan But Still Keeps Idaho Borders Closed, NuclearFuel, July 8, 1992, at 7 (Lexis, Nexis, Omni File).

²⁷⁴ See Montagne, Federal Nuclear Waste Disposal Policy, 27 Natural Resources Journal 309, at 395 (1987).

²⁷⁵ Congress has been under pressure to open WIPP since *New Mexico v. Watkins*, 783 F. Supp. 628 (D.C. 1991). In *Watkins*, the court, in order to allow shipments of nuclear wastes to WIPP, required Congress to enact legislation that would transfer control of the land where the WIPP is located from the Department of Interior to the DOE. Congress has eventually approved legislation that transfers control of the land to the DOE. Waste Isolation Pilot Plant Withdrawal Act, reprinted in H.R. CONF. REP. No. 1037, 102d Cong., 2d Sess. 11 (1992).

²⁷⁶ See Flynn, United States Press International, June 30, 1990 (Lexis, Nexis, Omni File). ("WIPP's strongest critics are officials from the state of Texas who are worried that the nuclear

pushed for the opening of WIPP.²⁷⁷ If WIPP does not eventually operate, the livelihood of nine hundred people currently employed at the facility will be at stake.²⁷⁸

Until the opening of a permanent repository, owners and operators of civilian power reactors have to provide interim storage for spent fuel by maximizing, to the extent practicable, the effective use of onsite storage facilities.²⁷⁹ The expansion of onsite storage capacity must be licensed by NRC. The licensing procedure includes oral arguments²⁸⁰ and an adjudicatory hearing.²⁸¹ If nuclear power reactors lack onsite storage capacity, the interim storage of spent fuel will become government's responsibility.²⁸²

When first enacted, the act provided that DOE must nominate five sites suitable for site characterization,²⁸³ and recommend to the President three sites as candidate sites for the first repository.²⁸⁴ Later on, DOE had to nominate another five sites, three of which would be recommended to the President for the second repository.²⁸⁵ The three sites recommended for the first repository were in Yucca Mountain, Nevada, Deaf Smith County, Texas,

waste may eventually seep into the nearby Pecos River and damage agriculture in 15 Texas counties."').

²⁷⁷ Opening New Mexico Waste Repository is Crucial to Nuclear Production, DOE Says, BNA, Federal Contracts Bureau, April 9, 1990, at 496 (Lexis, Nexis, Omni File).

²⁷⁸ Hickox, States News Service, May 21, 1992 (Lexis, Nexis, Omni File).

²⁷⁹ NWPA §131(a)(1), 42 U.S.C. §10151(a)(1). Additional storage in nuclear reactors should be provided only when it is consistent with the protection of public health, safety, and the environment, as well as economic considerations, continued operation of the reactor, and the views of the population living around the reactor. *See* NWPA §132, 42 U.S.C. §10152. Expansion of spent nuclear fuel storage capacity at the site of nuclear power reactors can be achieved "through the use of high-density fuel storage racks, fuel rod compaction, the transshipment of spent fuel to another civilian nuclear power reactor within the same utility system, the construction of additional spent nuclear fuel pool capacity or dry storage capacity, or by any other means" *See* NWPA §134(a), 42 U.S.C. §10154(a).

²⁸⁰ The oral argument should encompass "any matter which the Commission determines to be in controversy among the parties." At the time of oral argument each party should submit a written "summary of the facts, data, and arguments." *See* NWPA §134(a), 42 U.S.C. §10154(a).

²⁸¹ Adjudicatory hearing is granted only when NRC determines that there is "a genuine and substantial dispute of fact" which can be resolved during an adjudicatory hearing and which will likely determine NRC's decision. *See* NWPA §134(b), 42 U.S.C. §10154(b).

²⁸² NWPA §131, 42 U.S.C. §10151. *See also* NWPA §135(b), 42 U.S.C. §10155(b) (in order to undertake the responsibility of interim storage the government has to determine that the owner and operator of the reactor cannot reasonably provide adequate onsite storage, and that they have diligently pursued alternatives to government storage capacity). *See also* NWPA §135(g), 42 U.S.C. §10155(g) (NRC is required to promulgate procedures and criteria according to which it will determine the need for interim storage of spent fuel by the government). Section §135(a) & (h) (42 U.S.C. §10155(a) & (h)) specifies the type of facilities the NRC can choose from in designating the government interim storage facility. Section 136 (42 U.S.C. §10156) provides for the establishment of an Interim Storage Fund.

²⁸³ NWPA §112(b)(1)(A), 42 U.S.C. §10132(b)(1)(A) (1982).

²⁸⁴ NWPA §112(b)(1)(B), 42 U.S.C. §10132(b)(1)(B) (1982).

²⁸⁵ NWPA §112(b)(1)(C), 42 U.S.C. §10132(b)(1)(C) (1982).

and Hanford, Washington.²⁸⁶ Eventually, plans to establish a second repository were postponed because of estimates that nuclear waste production would decline.²⁸⁷

When the act was amended in 1987, the idea of a second repository was postponed until no later than January 1, 2010, when DOE has to report on the need for a second repository.²⁸⁸ Congress also decided that only one of the recommended sites, the one located in Nevada, would be subject to site characterization.²⁸⁹ Site characterization, however, does not guarantee that Yucca Mountain will host the nuclear waste repository. In fact, a recent earthquake in Nevada has made it doubtful that Yucca Mountain will be a suitable repository.²⁹⁰ If DOE determines, at any time, that Yucca Mountain is not suitable, it will have to notify Congress, and recommend the next step for finding a safe repository.²⁹¹

The exclusion from site characterization of the other sites recommended by DOE has been criticized widely as a political decision based on economic concerns instead of scientific grounds. Some claim that Congress wanted to save the large amounts of resources that would have been involved in characterizing other sites, and yielded to political pressure from the other two states which strongly opposed a repository within their borders.²⁹² It is uncertain, however, whether the gamble of characterizing only one site will save any money. If Yucca Mountain is unsuitable, Congress will have to allow the characterization of other sites. As a result, not only money, but also valuable time will be wasted.

States and indian tribes are dynamically involved in the process of designating the waste repository. The site characterization,²⁹³ site approval,²⁹⁴

²⁸⁶ Rosen, *Nevada v. Watkins: Who Gets the Shaft?* 10 Virginia Environmental Law Journal 239, at 247 (1991).

²⁸⁷ *Id.*

²⁸⁸ NWPA §161, 42 U.S.C. §10172a(b).

²⁸⁹ NWPA §160, 42 U.S.C. §10172. For the definition of site characterization, *see supra* note 261.

²⁹⁰ Blakeslee, *Earthquake Raises Concern About Nuclear Waste Dump*, N.Y. Times, July 4, 1992, at 6, col. 1.

²⁹¹ NWPA §113(c)(3), 42 U.S.C. §10133(c)(3).

²⁹² Rosen, *supra* note 286, at 250-55. In *Nevada v. Watkins*, 914 F. 2d. 1545 (9th Cir. 1990), Nevada unsuccessfully challenged the 1987 amendments of the NWPA.

²⁹³ A recommendation to the President for a site characterization must be accompanied by an environmental impact assessment. The environmental impact assessment is subject to judicial review. *See* NWPA §119, 42 U.S.C. §10139. The judicial review, however, is limited. *See* NWPA §112(1)(b)(D)-(E), 42 U.S.C. §10132(1)(b)(D)-(E) (1987). Preliminary activities are not subject to an environmental impact statement. *See* NWPA §112(d), 42 U.S.C. §10132(d) (1987).

²⁹⁴ DOE's recommendation to the President for site approval must include an environmental impact statement. *See* NWPA §114(f), 42 U.S.C. §10134(f). However, the assessment must not "consider the need for a repository or the alternatives to geologic disposal." *See* NWPA §114(a)(1)(D), 42 U.S.C. §10134(a)(1)(D).

and construction authorization processes require public hearings.²⁹⁵ The act requires DOE and NRC to provide states with “timely and complete information” on every aspect of the siting process, licensing, construction, and decommissioning of the repository.²⁹⁶ If upon a state’s written request for information, DOE fails to provide a written response within thirty days, DOE must immediately suspend all repository-related activities in the state.²⁹⁷ DOE must also consult and cooperate with the states in order to resolve their concerns about public health and safety and the environmental and economic impacts of the repository.²⁹⁸ In addition, the concerned state, at this point Nevada, may appoint a representative to conduct onsite oversight of the activities at the site.²⁹⁹ Nevada has also the right to veto the recommended site by filing a notice of disapproval within sixty days from the date the President submits the site to Congress for approval.³⁰⁰ The notice of disapproval must be accompanied by a statement entailing the reasons for disapproving the recommended repository.³⁰¹ Congress can override Nevada’s veto if, within ninety days after receiving the notice of disapproval, it passes a resolution, that eventually becomes law, approving Yucca Mountain.³⁰²

If Nevada agrees to forfeit its right to veto the final repository, DOE is authorized to enter into a benefits agreement with it.³⁰³ The benefits agreement provides funding of \$10 million before the first receipt of spent fuel, \$20 million upon the first receipt of spent fuel, and annual payments of \$20 million thereafter until the closure of the facility.³⁰⁴ The affected localities are entitled to one-third of such payments.³⁰⁵ Nevada, however, has refused to enter into such an agreement, and waive its right to veto the repository.³⁰⁶

Other states can also enter into a benefits agreement with DOE, if they volunteer to host the MRS facility. The Office of the Nuclear Waste Negotiator

²⁹⁵ See NWPA §113(a), 42 U.S.C. §10133(a); NWPA §114(a), 42 U.S.C. §10134(a). See also NWPA §112(b)(2), 42 U.S.C. §10132(b)(2).

²⁹⁶ NWPA §117(a)(1), 42 U.S.C. §10137(a)(1).

²⁹⁷ NWPA §117(a)(2), 42 U.S.C. §10137(a)(2).

²⁹⁸ NWPA §117(b), 42 U.S.C. §10137(b). Consultation and cooperation, however, are not necessary before congressional authorization for the construction of an MRS facility. See *Tennessee v. Herrington*, 806 F. 2d 646 (6th Cir. 1986), interpreting 42 U.S.C. §10161(h).

²⁹⁹ NWPA §117(d), 42 U.S.C. §10137(d).

³⁰⁰ NWPA §115(b)-(c), 42 U.S.C. §10135(b)-(c).

³⁰¹ NWPA §116(b)(2), 42 U.S.C. §10136(b)(2). See also NWPA §118(a), 42 U.S.C. §10138(a). The constitutionality of the state veto has been questioned. See Goldberg [Comment], the Nuclear Waste Policy Act of 1982: Does *Immigration & Naturalization Service v. Chadha* Veto the Congressional Override? 21 *Tulsa Law Journal* 694 (1986).

³⁰² NWPA §115(c), 42 U.S.C. §10135(c).

³⁰³ NWPA §170, 42 U.S.C. §10173.

³⁰⁴ NWPA §171(a)(1), 42 U.S.C. §10173a(a)(1).

³⁰⁵ NWPA §171(a)(7), 42 U.S.C. §10173a(a)(7). Also, if Nevada accepts to site the repository, it will receive “special consideration” in the siting of federal research projects. See NWPA §174, 42 U.S.C. §10174.

³⁰⁶ PP&L Executive Urges Adequate Funding for Nuclear Waste Program, PR Newswire, Mar. 31, 1992 (Lexis, Nexis, Omni File).

has been very active in this process.³⁰⁷ Seven jurisdictions have already applied for grants to study the safety of locating the MRS facility.³⁰⁸ Despite the optimism of the officials,³⁰⁹ however, the process does not seem very promising.³¹⁰ It appears that poor localities apply for grants only to get the money, without any intention of finally hosting the MRS facility.³¹¹

The benefits agreements must provide for a Review Panel, the purpose of which is to advise DOE on matters concerning the repository, and assist local communities in presenting their views to DOE.³¹² The composition of the Review Panel includes, in addition to representatives of DOE and the state, representatives of the affected localities, waste generators, and public-interest groups.³¹³

Radioactive waste projects are funded by the Nuclear Waste Fund (NWF) which is financed by utilities and other waste generators.³¹⁴ The purpose of the Fund is to sponsor all radioactive waste disposal projects, such as the identification, construction, and licensing of the permanent repository or the MRS facility.³¹⁵ The Fund resources will also be available to states, local governments and indian tribes after the construction authorization is expressly given.³¹⁶ Funding will additionally be available, after approval of a site for characterization, when DOE enters into a cooperation agreement with the affected state.³¹⁷ Consequently, Nevada is entitled to receive grants that will enable it to participate in the evaluation of Yucca Mountain.³¹⁸ In fact, even when Nevada was just one of the candidate host states, courts held

³⁰⁷ The task of the Nuclear Waste Negotiator is to find a state or indian tribe willing to host the repository or the MRS facility. *See* 42 U.S.C. §10242(b)(2).

³⁰⁸ *Underground Tests at Yucca Mountain Needed, Board Official Tells House Panel*, BNA, Daily Report For Executives, Mar. 11, 1992 (Lexis, Nexis, Omni File).

³⁰⁹ Bartlett, Response, Nuclear News, Mar. 1992 (Lexis, Nexis, Omni File).

³¹⁰ *Arizona Governor Says State Is Not Interested in Hosting an MRS*, Copyright 1992 McGraw-Hill, Inside Energy/With Federal Lands, Feb 10, 1992 (Lexis, Nexis, Omni File). *See also* Behrens, *North Dakota Voters Recall Commissioners Who Asked for MRS Grant*, Copyright 1992 McGraw-Hill, Inside Energy/With Federal Lands, Mar. 16, 1992 (Lexis, Nexis, Omni File). But *see* Lane, *More Applicants Seek Funding for MRS Grants*, The Energy Daily, April 8, 1993 (Lexis, Nexis, Omni File).

³¹¹ *Leroy Seeks MRS Deadline Extension*, Copyright 1992 McGraw-Hill, Inside Energy/With Federal Lands, Mar. 30, 1992 (Lexis, Nexis, Omni File). *See also* *Panel Urges Congress End Work on Monitored Retrievable Storage*, Copyright 1992 McGraw-Hill, Inside Energy/With Federal Lands, Mar. 2, 1992 (Lexis, Nexis, Omni File).

³¹² NWPA §172(c), 42 U.S.C. §10173b(c).

³¹³ NWPA §172(a), 42 U.S.C. §10173b(a).

³¹⁴ NWPA §302, 42 U.S.C. §10222.

³¹⁵ NWPA §302(d), 42 U.S.C. §10222(d).

³¹⁶ NWPA §302(d)(6), 42 U.S.C. §10222(d)(6).

³¹⁷ NWPA §117(c)(5), 42 U.S.C. §10137(c)(5).

³¹⁸ NWPA §116(c), 42 U.S.C. §10136(c).

that it was entitled to funding.³¹⁹ Nevada has already engaged in legal battles with local governments over the distribution of federal funding.³²⁰

4.2. Seeking Standards

Because the act deals with the politics of radioactive waste management, one would expect EPA and NRC to enact detailed standards, but this has not yet happened.³²¹ According to the act, EPA must promulgate general standards for the protection of the environment from offsite releases of radioactive material.³²² NRC must promulgate technical standards for the construction, operation, and closure of the repository.³²³ Furthermore, NRC standards should mandate multiple barriers in the design of the repository,³²⁴ and a type of construction that would allow waste retrieval for health, safety, and environmental reasons, or for reprocessing.³²⁵ "Multiple barriers," however, and the kind of repository that will make possible waste retrieval are left unclarified by the act. Consequently, NWPA is in stark contrast with RCRA which establishes detailed minimum technological requirements for land disposal facilities, and specific performance standards for incineration.

NRC outlines the "performance objectives" of the waste repository. It provides that containment of high-level radioactive waste within its package must be "substantially complete" for at least 300 years, and no more than 1,000 years after the permanent closure of the repository.³²⁶ The release rate of any radionuclide from the engineered barrier after the containment period must not exceed 1 in 100,000 per year, if the radionuclide is present for at least 1,000 years after permanent closure.³²⁷ The repository should be so situated that a radionuclide's fastest travel path from "the disturbed zone"³²⁸ to the "accessible environment"³²⁹ is at least 1,000 years.³³⁰ These

³¹⁹ State of Nevada v. Herrington, 827 F.2d 1394 (9th Cir. 1987).

³²⁰ See NWPA §116(c)(3), 42 U.S.C. §10136(c)(3). See also Nye County, Nevada v. State of Nevada, No. 4606 (5th Dist. Ct. Nev., Oct. 7, 1987).

³²¹ See, e.g., 10 C.F.R. 60.111–60.113(b)(1).

³²² NWPA §121(a), 42 U.S.C. §10141(a).

³²³ NWPA §121(b), 42 U.S.C. §10141(b). The promulgation of standards by both NRC and EPA is not subject to an environmental impact assessment. See NWPA §121(c), 42 U.S.C. §10141(c).

³²⁴ NWPA §121(b)(1)(B), 42 U.S.C. §10141(b)(1)(B).

³²⁵ NWPA §122, 42 U.S.C. §10142.

³²⁶ 10 C.F.R. 60.113(a)(1)(ii)(A).

³²⁷ 10 C.F.R. 60.113(a)(1)(ii)(B).

³²⁸ Disturbed zone is defined as "that portion of the controlled area the physical and chemical properties of which have changed as a result of underground facility construction or as a result of heat generated by the emplaced radioactive wastes such that the resultant change of properties may have a significant effect on the performance of the geologic repository." See 10 C.F.R. 60.2.

³²⁹ "Accessible environment means: (1) The atmosphere, (2) the land surface, (3) surface water, (4) oceans, and (5) the portion of lithosphere that is outside the controlled area." *Id.*

³³⁰ 10 C.F.R. 60.113(a)(2).

standards, however, can be modified on a case-by-case basis "provided that the overall system performance objective ... is satisfied."³³¹ In order to modify the standards on a case-by-case basis, NRC must take into account the EPA standards, the age and nature of the waste, the design of the underground facility, the geochemical characteristics of the host rock, and groundwater, as well as the inherent uncertainties in predicting the performance of the geologic repository.³³²

Under the EPA pre-closure health standards,³³³ the management of high-level radioactive wastes must provide "reasonable assurance" that the annual dose from releases of radioactive material to any individual does not exceed certain levels.³³⁴

The EPA post-closure health standards prescribe that disposal facilities should be designed in a fashion that would provide "reasonable expectation" that for 1,000 years after disposal the annual dose to any individual in the accessible environment will not exceed 25 millirems to the whole body and 75 millirems to any critical organ. In calculating this dose it should be assumed that "individuals consume 2 liters per day of drinking water from any significant source of groundwater outside the controlled area."³³⁵

There must also exist a "reasonable expectation" that 1,000 years after disposal the concentration of radionuclides in the groundwater will not exceed certain specified amounts.³³⁶ However, only special sources of groundwater are protected – sources within the area of the disposal facility or five kilometers beyond that area supplying drinking water for thousands of people, and irreplaceable, in the sense that "no reasonable alternative source of drinking water is available to the population."³³⁷ This standard has been widely criticized as having been invented to justify ex-post-facto DOE's selection of candidate repository sites.³³⁸

In addition to health and groundwater standards, EPA has promulgated containment standards. These standards require that radioactive waste disposal must provide "a reasonable expectation based upon performance assessments," that the releases of radionuclides to the accessible environment for

³³¹ 10 C.F.R. 60.113(b).

³³² *Id.*

³³³ NRC may enter into agreements with states concerning radioactive waste disposal. *See* Atomic Energy Act §274(b), 42 U.S.C. §2021(b).

³³⁴ These levels are: 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other critical organ at NRC-regulated facilities. *See* 40 C.F.R. 191.03(a). *See also* 40 C.F.R. 191.02(q). The standards are less stringent at DOE-regulated facilities. *See* 40 C.F.R. 191.03(b). EPA may also issue alternative standards for DOE-regulated facilities as long as no individual is receiving a continuous exposure of more than 100 millirems per year, or an infrequent exposure of more than 500 millirems per year. *See* 40 C.F.R. 191.04.

³³⁵ 40 C.F.R. 191.15.

³³⁶ 40 C.F.R. 191.16.

³³⁷ *See* 40 C.F.R. 191.12(o).

³³⁸ *See* Montagne, *supra* note 274, at 387. *See also* Frishman, High-Level Nuclear Waste Repository Siting: A State Perspective, 53 Tennessee Law Review 527, at 533–37 (1986).

10,000 years after disposal have a chance of less than one in ten of exceeding certain specified quantities.³³⁹ However, the performance assessments "need not provide complete assurance that the [containment requirements] will be met."³⁴⁰ In this manner, EPA acknowledges that the longer time needed for the isolation of radioactive wastes increases the uncertainty about the performance of the disposal system.

In addition, EPA provides that institutional controls over disposal sites should be maintained for as long as it is practicable. Performance assessments, however, should be made under the assumption that institutional controls will end after one hundred years.³⁴¹ Disposal sites should also be monitored, and should be easily identifiable by permanent markers, records, or other institutional controls.³⁴² Natural and engineered barriers should also be used for the isolation of the wastes, and waste removal must be possible for a reasonable period of time after disposal.³⁴³

NRC provides comparatively more detailed requirements than EPA for the siting and design of the radioactive waste repository. However, even these requirements are far from specific.³⁴⁴ In fact, NRC and EPA requirements have often been criticized as vague and lenient.³⁴⁵ NRC's performance objectives can be modified on a case-by-case basis and permit migration of radionuclides. EPA health standards which provide for limited groundwater protection have been invalidated by a court on the ground that they are less stringent than the standards promulgated under the Safe Drinking Water Act.³⁴⁶ EPA standards do not also mandate for attainment of ALARA³⁴⁷

³³⁹ 40 C.F.R. 191.13(a). The amounts that the radionuclides cannot exceed are provided in Table 1 of 40 C.F.R. 191, Subpt. B, App. A.

³⁴⁰ 40 C.F.R. 191.13(b).

³⁴¹ 40 C.F.R. 191.14(a).

³⁴² 40 C.F.R. 191.14(b)-(c).

³⁴³ 40 C.F.R. 191.14(d) & (f).

³⁴⁴ NRC siting requirements provide that geochemical conditions should promote precipitation or sorption of the radionuclides, that the repository should be sited away from population centers, and that the water table should be sufficiently below the underground facility. *See* 10 C.F.R. 60.122(b). In addition, the repository should be sited away from areas where there is a potential for flooding, volcanic activity, change in hydrological conditions, or earthquakes, or where geochemical processes could increase the chemical reactivity of the engineered barrier system. *See* 10 C.F.R. 60.122(c). Also the repository should be designed in a manner that will limit the concentrations of radioactive material in the air, and will protect against natural phenomena, equipment failure, and fires or explosions. Moreover, it should be designed so as to ensure timely response to emergency situations and periodic inspections, and with sufficient flexibility so as to allow for future adjustments. *See* 10 C.F.R. 60.131(a)-(b). Other necessary components include control of water and gas and a ventilation system. *See* 10 C.F.R. 60.133(d) & (g).

³⁴⁵ *See* Montagne, *supra* note 274, at 380-84.

³⁴⁶ *See* Natural Resources Defense Council, Inc., v. EPA, 824 F.2d 1258 (1st Cir. 1987). Under the Safe Drinking Water Act, EPA has determined that annual dose equivalent to the body or any critical organ must not exceed 4 millirem per year. *See* 40 CFR 141.16(a). But *see supra* note 334.

³⁴⁷ Montagne, *supra* note 274, at 184.

as explicitly required under international regulations.³⁴⁸ On the other hand, DOE has argued that EPA's standards are too stringent,³⁴⁹ and will drive the licensing costs of a repository up to \$6 billion from an original estimate of \$100 million.³⁵⁰ Because of lack of resources, DOE has not even started the site characterization of Yucca Mountain. It plans, however, to begin receiving wastes at the repository in 1998, and repository operations in 2010.³⁵¹

Despite the widespread criticism, I believe that the act has provided for what is currently needed: a public participation and a public relations mechanism that would facilitate decisionmaking in the face of fierce opposition. On the way, however, the statute has been largely politicized by the abandonment of characterization of rival repository sites without any scientific justification. The regulatory process is also cumbersome since it is difficult to promulgate standards in the midst of widespread uncertainty about the performance of geologic formations. The current uncertainty, however, should not lead to the adoption of a zero exposure standard which would be unrealistic. NRC performance standards, which allow some migration of radionuclides, are pragmatic. Once more information on different geologic formations becomes available, the standards should be made more specific. Because of the criticisms of EPA standards Congress has demanded their repromulgation after consultation with the National Academy of Sciences.³⁵² In the meantime, the Supreme Court has upheld state moratoria on the construction of nuclear energy plants until demonstrated technology for the permanent radioactive waste disposal becomes available.³⁵³

5. LLRWA: A FAILURE OF REGIONALISM

5.1. *The Gap between Vision and Reality*

The Low-level Radioactive Waste Act (LLRWA)³⁵⁴ defines low-level radioactive wastes by exclusion. Low-level radioactive wastes are those classified by NRC as low-level radioactive wastes,³⁵⁵ and are not high-level

³⁴⁸ See Chapter 2, Section 3.

³⁴⁹ Rising Costs of Yucca Mountain Studies Driven by EPA Rules, DOE Official Says, BNA, Daily Report For Executives, April 2, 1992, at A-26 (Lexis, Nexis, Omni File).

³⁵⁰ *Id.*

³⁵¹ Underground Tests at Yucca Mountain Needed, Board Official Tells House Panel, BNA, Daily Report for Executives, Mar. 11, 1992, at A-2 (Lexis, Nexis, Omni File). ("Eight or more permits will be needed for underground testing and 16 or more may be needed eventually.")

³⁵² Energy Policy Act of 1992, §801, reprinted in H.R. CONF. REP. No. 1018, 102d 1992, Cong., 2d Sess. 153-54 (1992).

³⁵³ See, e.g., *Pacific Gas & Electric Co., v. State Energy Resources Conservation & Development Commission*, 461 U.S. 190 (1983).

³⁵⁴ 42 U.S.C. §2021b-2021j. The act was first adopted in 1980 and was amended in 1985.

³⁵⁵ 42 U.S.C. §2021b(9).

wastes,³⁵⁶ spent nuclear fuel, or byproduct material.³⁵⁷ But this division of wastes into low- and high-level is not practical since wastes presenting more diverse levels of radioactivity are encountered. Thus, DOE classifies radioactive wastes as spent fuel, low-level, high-level, transuranic, mill tailings, and remedial action.³⁵⁸ As also emphasized, other countries tend to manage radioactive wastes on a case-by-case basis without being faithful to official definitions.³⁵⁹

The LLRWA is designed on the premise that low-level radioactive wastes “can be most safely and effectively managed on a regional basis.”³⁶⁰ For that purpose, states may enter into regional agreements or “compacts” with each other and establish regional disposal facilities.³⁶¹ Although the act does not explicitly require states to enter into compacts with other states, it indirectly advances the creation of compacts by allowing compact states to exclude non-member states from the compact’s disposal facilities.

More specifically, during the transitional period from 1986 to 1993, exporting states have to endure significant limitations on the amount of wastes they can dispose of at the existing disposal sites in Barnwell, South Carolina; Richland, Washington; and Beatty, Nevada.³⁶² In addition, importing states may impose surcharges on incoming wastes. Moreover, the longer a state keeps exporting wastes to a regional disposal facility, the more the surcharges increase.³⁶³

States not belonging to a regional compact have to meet certain milestones. By July 8, 1986, unaligned states were required to ratify a compact or indicate their intent to develop their own site.³⁶⁴ Only three states have been unable to meet this milestone: North Dakota, Vermont, and Puerto Rico. By January 1, 1988, compacts without a site had to identify the state that would locate the disposal facility, while non-member states had to develop a detailed siting plan for a disposal facility.³⁶⁵ By January 1990, compacts and unaffiliated states had to apply for a license to operate a disposal facility, or provide written certification of their capability to manage their low-level radioactive wastes within their borders.³⁶⁶ Any state or region not in compliance with the

³⁵⁶ For the definition of high-level radioactive wastes, see *supra* note 258.

³⁵⁷ The term byproduct material is defined in 42 U.S.C. §2014(e) of the Atomic Energy Act as “(1) any radioactive material yielded in or made radioactive by exposure to the radiation incident to the process of producing and utilizing special nuclear material, and (2) the tailings or wastes produced by the extraction or concentration of thorium from any ore processed primarily for its source material content.”

³⁵⁸ R.L. Murray, *Understanding Radioactive Waste* 59 (1989).

³⁵⁹ See *supra* note 5, Chapter 3.

³⁶⁰ 42 U.S.C. §2021d(a)(1).

³⁶¹ 42 U.S.C. §2021d(a)(2).

³⁶² 42 U.S.C. §2021(e)(a)-(c).

³⁶³ 42 U.S.C. §2021e(d)(1).

³⁶⁴ 42 U.S.C. §2021e(e)(1)(A).

³⁶⁵ 42 U.S.C. §2021e(e)(1)(B).

³⁶⁶ 42 U.S.C. §2021e(e)(1)(C).

previous milestones had to apply for a license to operate a disposal facility, the latest, by January 1, 1992.³⁶⁷

Failure to comply with any of the above milestones entails additional surcharges, for the offending state, that are two or four times the surcharges initially paid.³⁶⁸ The amount of surcharges may eventually turn out to be as much as the cost of disposal.³⁶⁹ Also, a year after a state fails to meet a milestone, it may be denied access to the disposal facilities of importing states.³⁷⁰ In order to prevent arbitrary denials of access to disposal facilities, the act provides that access to disposal facilities may not "be based on the source, class or type" of waste.³⁷¹ States that meet the milestones are rewarded with rebates on their surcharge payments.³⁷² While the act grants to compact states the right to exclude non-member states from their disposal facilities, it does not grant the same right to unaffiliated states. If unaffiliated states exclude waste imports from their facilities, they will be found most probably in violation of the commerce clause.³⁷³

If after January 1, 1993, a state is unable to provide disposal for the waste it generates, any generator may request the state to "take title" to wastes, or assume liability for failure to do so.³⁷⁴ If a state accepts responsibility for the waste, then it is entitled to a rebate.³⁷⁵ Otherwise, the amount of any surcharges that the generator has already paid must be paid back to her, with interest, until the state provides a disposal facility or until, January 1, 1996, whichever is earlier.³⁷⁶ If a state is unable to provide disposal for low-level wastes generated within its borders by January 1, 1996, it will be liable for all the damages directly or indirectly incurred by generators.³⁷⁷ By enacting this provision, Congress intended to pressure states to join compacts and develop disposal facilities. What was achieved, however, was to displace responsi-

³⁶⁷ 42 U.S.C. §2021e(e)(1)(D).

³⁶⁸ See, e.g., 42 U.S.C. §2021e(e)(2)(A)-(B). For the surcharges initially paid, see *supra* note 363.

³⁶⁹ Low-Level, *supra* note 33, at 123-24, Chapter 2.

³⁷⁰ After the breach of the 1990 deadline, importing states can immediately deny access to their disposal facilities. See 42 U.S.C. §1021e(e)(2)(C). However, states that miss the 1992 deadline have to only pay a surcharge. See 42 U.S.C. §2021e(e)(2)(D).

³⁷¹ 42 U.S.C. §2021e(e)(3).

³⁷² 42 U.S.C. §2021e(d)(2). See also 42 U.S.C. §2021e(d)(2)(E) (rebates can be used "to (I) establish low-level radioactive waste disposal facilities; (II) mitigate the impact of low-level radioactive waste disposal facilities on the host state; (III) regulate low-level radioactive waste disposal facilities; or (IV) ensure the decommissioning, closure, and care during the period of institutional control of low-level radioactive waste disposal facilities").

³⁷³ See *supra* Section 3. See also Condon, *The Never Ending Story: Low-Level Waste and the Exclusionary Authority of Noncompacting States*, 30 *Natural Resources Journal* 65 (1990); Berkovitz, *Waste Wars: Did Congress "Nuke" State Sovereignty in the Low-Level Radioactive Waste Policy Amendments Act of 1985*, 11 *Harvard Environmental Law Review* 437 (1987).

³⁷⁴ 42 U.S.C. §2021e(d)(2)(C)(i).

³⁷⁵ 42 U.S.C. §2021e(d)(2)(C)(ii).

³⁷⁶ *Id.*

³⁷⁷ *Id.*

bility from polluters to state governments. Eventually, the Supreme Court has struck down the "take title provisions" as violating the tenth Amendment guarantee of state sovereignty.³⁷⁸

As could be expected, the act has spurred a multiplication of compacts. Nine compacts have already been formed, some of them containing only two states.³⁷⁹ Compacts with disposal facilities are organized around existing disposal sites.³⁸⁰ Compacts without facilities have encountered tremendous difficulties in finding disposal sites because of the public opposition. Michigan, for example, was expelled from the Midwest compact because of its inability to site a disposal facility.³⁸¹ Ohio, the second larger producer of low-level wastes in the compact, has confronted similar difficulties which have precipitated the construction of onsite storage facilities.³⁸² California, the host state for the Southwest compact, has been sued by other member states, nuclear medicine organizations and radiation research facilities for delaying unnec-

³⁷⁸ *New York v. United States*, 112 S. Ct. 2408 (1992).

³⁷⁹ Low-Level, *supra* note 369, at 126-27. *See also* Medical Radioactive Materials Users Face Disposal Limits, Soaring Costs, *Medical Waste News*, Jan. 20, 1993 (Lexis, Nexis, Omni File). The compacts are: The Appalachian compact, comprised of the states of Delaware, Maryland, Pennsylvania, and West Virginia, which has designated Pennsylvania as the host state. Chem-Nuclear Systems, the company that has undertaken the construction of the disposal facility, is still at the site screening stage. *See* Zuercher, CNSI Drops 46% of Pennsylvania from LLW Facility Consideration, *Nucleonics Week*, Feb. 25, 1993, at 11 (Lexis, Nexis, Omni File). The Central states compact is comprised of Arkansas, Kansas, Louisiana, Nebraska and Oklahoma and has designated Nebraska as the host state. Nebraska has already selected three candidate sites. The Midwest compact, comprised of the states of Indiana, Michigan, Minnesota, Missouri, Iowa, Ohio and Wisconsin, has designated Michigan as the host state, but Michigan failed to select a site, and has, for that reason, been expelled from the compact. The Southwest compact comprised of Arizona, California, North and South Dakota has designated California, and, after thirty years, Arizona as host states. Both states have already selected disposal sites.

Compacts organized around existing sites are: the Northwest compact comprised of Alaska, Hawaii, Idaho, Montana, Oregon, Utah, and Washington, which has designated as a disposal site an existing site in Richland, Washington. This facility will remain open indefinitely because of the difficulties of siting an alternative site. The Southeast compact, comprised of the states of Alabama, Florida, Georgia, Mississippi, North and South Carolina, Tennessee, and Virginia, has designated South Carolina - where the Barnwell facility is situated - until June 30, 1994, and North Carolina, after that date, as the host states. The Rocky Mountains compact, comprised of Colorado, Nevada, New Mexico and Wyoming, had designated Beatty in Nevada as the disposal site. Nevada has now closed the site permanently, but the company that previously ran the facility seeks to reopen it. *See* Zuercher, Nevada Lawmaker, US Ecology Seek to Reopen Beatty LLW Facility, *Nucleonics Week*, Mar. 4, 1993, at 3 (Lexis, Nexis, Omni File).

Two compacts are comprised of only two states: the Central Midwest compact, comprised of Illinois and Kentucky, has designated Illinois as the host state. *See* Ayers, Ortziger Opposes Nuclear Commission Budget, *The United Press International*, July 16, 1992 (Lexis, Nexis, Omni File). The Northeast compact, comprised of the states of Connecticut and New Jersey, is a peculiar compact since each state will provide its own disposal site.

³⁸⁰ *Id.*

³⁸¹ Ohio Is Not Sited for Nuclear Dump, *United Press International*, July 1, 1992 (Lexis, Nexis, Omni File).

³⁸² Perry Power Plant to Build Low-Level Radioactive Waste Processing Facility, *PR Newswire*, Aug. 3, 1992 (Lexis, Nexis, Omni File).

essarily the site licensing process.³⁸³ South Carolina has decided to prolong the use of Barnwell for the Southeast compact until January 1996 because of North Carolina's difficulties in finding a repository.³⁸⁴ North Carolina's access to Barnwell, however, will be prohibited by 1994, if it fails to site a facility ten miles away from any neighboring state that would not pose any threat to the environment of the neighboring states.³⁸⁵ Other states are still looking for compact membership, or have decided to go alone.³⁸⁶ What is actually happening is that states generating the most low-level radioactive wastes usually become the host states for their region. And states generating small volumes of waste either decide to associate themselves with similar states or remain unaffiliated.³⁸⁷

The compact scheme, as implemented to date, has been criticized as wasteful and inefficient. When Congress designed the act, it contemplated fewer compacts, and never expected that states would choose to go alone, or to form two-state compacts.³⁸⁸ There are strong indications that the shrinking volumes³⁸⁹ of low-level radioactive wastes will make unnecessary such a large number of disposal sites. Smaller volumes will also increase the costs of developing and maintaining disposal facilities.³⁹⁰ It has been speculated that compacts generating small amounts of radioactive waste, like the Rocky Mountains, will eventually attempt to lure states with larger amounts in order to sustain their facilities.³⁹¹ However, the Rocky Mountains and Northwest compacts have now agreed that Rocky Mountains will ship its wastes to the Northwest compact.³⁹² This is a sensible agreement that could potentially benefit both compacts. A research study has demonstrated that incorporating existing compacts into four "supercompacts," and minimizing the number

³⁸³ Supporters of Low-Level Radioactive Waste Disposal Facility File Multiple Suits Against the State of California, PR Newswire, July 21, 1992 (Lexis, Nexis, Omni File).

³⁸⁴ Late News in Brief, Nuclear News, July 1992, at 83 (Lexis, Nexis, Omni File).

³⁸⁵ *Id.*

³⁸⁶ See Low-Level, *supra* note 369, 128-29 (Texas, New York and Massachusetts have decided to develop their own sites. Vermont, Rhode Island, Maine and Puerto Rico are pursuing Texas to develop a compact with it. New York and Massachusetts have not yet found a disposal site).

³⁸⁷ Low-Level, *supra* note 369, at 129-30.

³⁸⁸ Condon, *supra* note 373, at 69.

³⁸⁹ In the United States the volume of low-level radioactive wastes has declined by about half in the last nine years. This decrease has been attributed to the surcharges that have to be paid for disposal. However, while cost increases may provide incentives for waste reduction, smaller waste volumes reduce economies of scale and increase disposal costs. OTA(1989), *supra* note 55, at 3, Chapter 1.

³⁹⁰ *Id.*

³⁹¹ Low-Level, *supra* note 369, at 130. ("It is also likely that compacts will begin competing with each other to acquire additional volumes of LLRW [low-level radioactive waste] needed for economically viable operation of their facilities. Conversely, generators in states like New York, where there is no legal requirement to use an in-state facility, may begin to ship their wastes to the lowest bidder.").

³⁹² Zuercher, Northwest, Rocky Mt. Compacts Ratify Pact for Joint LLW Disposal, Nucleonics Week, Nov. 26, 1992, at 11 (Lexis, Nexis, Omni File).

of new sites to four would result in 2.8 to 3 billion savings.³⁹³ Despite the decision of the Rocky Mountains compact, nothing prevents compacts from eventually competing for diminishing volumes of radioactive wastes. U.S. Ecology, for example, which manages the Richland site for the Northwest compact, filed an action against a Utah facility managed by Envirocare for accepting low-level radioactive wastes without surcharges.³⁹⁴

Another inefficient practice encouraged by the compact scheme is that states undertake the responsibility of building disposal sites in the expectation that another state in a few years will do the same. This will lead inevitably to multiplication of disposal sites sacrificing the goal of inter-generational equity for the sake of provisional inter-regional fairness.

5.2. NRC's Inadequate Standards and Mixed Wastes

NRC divides low-level radioactive wastes into three classes: A, B, or C.³⁹⁵ Class A radioactive wastes represent the bulk of radioactive wastes, but in most cases contain very little radioactivity.³⁹⁶ They are considered relatively harmless, and do not need institutional controls to be disposed of safely.³⁹⁷ Class B wastes must be under institutional control for 100 years,³⁹⁸ and class C wastes must be controlled for 500 years.³⁹⁹ Wastes with concentrations above the limits of class C wastes need to be under institutional control for more than 500 years, and may be "acceptable for near-surface disposal with special processing or design" only on a case-by-case basis.⁴⁰⁰

States are responsible for Class A, B and C wastes generated within their borders, while the federal government is responsible for the management of the above-Class C wastes.⁴⁰¹ The federal government is also responsible for defense wastes,⁴⁰² high-level wastes and spent fuel as mentioned in the analysis of NWPA.

³⁹³ Low-Level, *supra* note 369, at 134.

³⁹⁴ Zuercher, *US Ecology Sues for Level Playing Field to Stop Diversion of LLW to Utah*, Copyright McGraw-Hill Inc., Inside N.R.C., April 20, 1992, at 5 (Lexis, Nexis, Omni File). *See also* Clarke, *Utah Violating LLW Rules, US Ecology Charges*, *The Energy Daily*, Nov. 17, 1992 (Lexis, Nexis, Omni File).

³⁹⁵ 24 U.S.C. §2021c(a)(1)(A). *See also* 10 C.F.R. 61.55.

³⁹⁶ *See* OTA(1989), *supra* note 389, at 7. *See also* 10 C.F.R. 61.7(b)(2).

³⁹⁷ *Id.*

³⁹⁸ 10 C.F.R. 61.7(b)(4).

³⁹⁹ 10 C.F.R. 61.7(b)(5). In order to determine the class low-level radioactive wastes belong to and, consequently, the kind of institutional controls needed, NRC takes into account the concentration of radionuclides in the waste. *See* 10 C.F.R. 61.55.

⁴⁰⁰ 10 C.F.R. 61.7(b)(5). OTA has determined that a conservative approach to the management of greater than class C wastes would be to treat them as high-level wastes and dispose of them in underground repositories. *See* *Thousands of Generators of Low-Level Waste Have No Place to Dispose of It*, OTA Finds, BNA, Daily Report for Executives, Oct. 18, 1988 (Lexis, Nexis, Omni File).

⁴⁰¹ 42 U.S.C. §2021c(b)(1)(D).

⁴⁰² 42 U.S.C. §2021c(b)(1)(A)-(C).

NRC's classification system has been criticized for including wastes with too low radioactivity in class A overburdening thus the existing disposal system.⁴⁰³ It has been proposed, instead, that radioactive wastes with lives between 90 to 180 days should be left to decay onsite.⁴⁰⁴ Wastes that decay within 100 to 200 years must be stored for that time rather than be disposed of.⁴⁰⁵ And Class A wastes containing long-lived radionuclides should be subject to the disposal standards for class B and C wastes.⁴⁰⁶

NRC regulations⁴⁰⁷ have also been criticized for concentrating on shallow land burial, and for not providing standards for other disposal methods.⁴⁰⁸ This will create problems in the future because most states have opted for the development of engineered facilities, hoping to mitigate in this manner public opposition related to land burial.⁴⁰⁹ Moreover, NRC's standards have

⁴⁰³ Low-Level, *supra* note 369, at 41-42.

⁴⁰⁴ *Id.*

⁴⁰⁵ *Id.* at 42.

⁴⁰⁶ *Id.* See also 10 C.F.R. 61.55(a)(2)(i)-(iii).

⁴⁰⁷ NRC regulations are devoted to land disposal in "near surface facilities," the so-called shallow land burial. See 10 C.F.R. 61.7. For more details on shallow land burial, see Chapter 3, Section 1.1. Low-level disposal facilities must meet certain performance objectives: the annual radiation doses from releases of radioactive material to any member of the public must not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ. See 10 C.F.R. 61.41. Occupational radiation doses also must not exceed certain prescribed limits. See 10 C.F.R. 61.43, 10 C.F.R. 20.101. In addition, reasonable efforts should be made to keep radiation doses as low as is reasonably achievable (ALARA). See 10 C.F.R. 61.41, 10 C.F.R. 61.43. The facility must comply with technical requirements, for example, it should be designed in a manner that would prevent groundwater intrusion, and be built away from floodplains, seismic and volcanic areas. See 10 C.F.R. 61.50. Monitoring is necessary before applying for a license - in order to provide data on the characteristics of the disposal site - until the post-closure period. See 10 C.F.R. 61.53. It is provided that the liquid in wastes must be minimized as much as is reasonably achievable, and that liquids must never exceed 1 percent of the volume of the wastes. See 10 C.F.R. 61.56(b)(2). Also certain very low-level radioactive wastes in aqueous and liquid form may be disposed of into sanitary sewage systems. See 10 C.F.R. 20.303. Exemptions from those regulations may be granted only if that will not endanger life, property or common defense and security. See 10 C.F.R. 61.6.

An application for a license to operate a low-level radioactive waste facility should include all the information about the applicant, and the planned disposal facility. Applicants must demonstrate that the facility will comply with the performance objectives and the technical requirements. See 10 C.F.R. 61.10-61.31. They should also provide assurances that funds will be available to cover the construction, operation, decontamination, and closure expenses of the facility. See 10 C.F.R. 61.61-61.62.

⁴⁰⁸ 10 C.F.R. 61.7. For more details on other disposal options, see Chapter 3, Section 1.1. Incineration of low-level radioactive wastes is prohibited (10 C.F.R. 20.305) unless the wastes have very low concentration of radioactivity, for example, in the case of scintillation fluids and animal carcasses (10 C.F.R. 20.306).

⁴⁰⁹ Graham, Payne, Rippon and Zacha, Planning for the '90s and Beyond, Nuclear News, Jan. 1, 1990, at 82 (Lexis, Nexis, Omni File). But see also Low-Level, *supra* note 369, at 113. See also OTA (1989), *supra* note 389, at 11, referring to engineered disposal methods for low-level radioactive wastes. ("Site-specific designs, appropriate construction, and comprehensive short- and long-term management of a LLW disposal facility are just as important as the particular design technology chosen. More elaborate designs, if poorly constructed or

been criticized because they do not provide for no migration of radionuclides, but allow releases of radioactivity.⁴¹⁰

The standards for the disposal of low-level radioactive wastes are conceptually different from the standards applying to hazardous wastes. The hazardous waste disposal standards provide for no migration of hazardous constituents, and establish minimum engineered barriers. On the contrary, the low-level waste disposal standards explicitly permit migration, and do not prescribe technological barriers that would prevent water infiltration.⁴¹¹ In addition, while EPA requires a thirty-year post-closure monitoring of hazardous waste disposal facilities, institutional controls for low-level radioactive wastes may be required for as long as 500 years. But low-level radioactive waste monitoring cannot be as frequent as hazardous waste monitoring. The frequent inspections of disposal sites required by EPA could expose workers in radioactive waste sites to large doses of radiation.

The differences between hazardous and radioactive waste disposal standards have jeopardized the regulation of mixed wastes. Mixed wastes demonstrate both hazardous and radioactive characteristics. They are regulated by both NRC and EPA, which have decided that RCRA applies to the hazardous properties of the waste, and that the radioactive properties are regulated by NRC.⁴¹² Given the divergent premises of the NRC and EPA standards, however, it is unclear which standards should apply for the regulation of mixed wastes. Industry is reluctant to comply with both NRC and EPA standards because of the huge costs involved.⁴¹³ Moreover, the absence of treatment and disposal facilities for low-level wastes leaves no option for mixed waste generators other than illegal waste disposal or illegal waste storage.⁴¹⁴ Generators have attempted to resolve this dilemma by trying to produce less mixed wastes. Some generation of mixed wastes, however, is unavoidable.⁴¹⁵

EPA has prohibited the land disposal of mixed wastes,⁴¹⁶ unless they have been treated, and has prescribed technology-based standards for certain categories of mixed wastes.⁴¹⁷ EPA has also granted a nationwide variance that allows disposal facilities in compliance with the minimum technological requirements to accept mixed wastes.⁴¹⁸ These regulations, however, have not lessened the reluctance of disposal facilities to accept mixed wastes.⁴¹⁹

managed, may not provide more long-term waste isolation than a less elaborate facility that is well constructed and well-managed [emphasis in the original].").

⁴¹⁰ *Id.*, OTA(1989), at 12.

⁴¹¹ *Id.* at 59-60.

⁴¹² 51 Fed. Reg. 24504 (July 3, 1986).

⁴¹³ OTA(1989), *supra* note 389, at 74 (it has been estimated that complying with both standards will increase site characterization costs by \$2 million to \$4 million per site).

⁴¹⁴ *Id.*

⁴¹⁵ *Id.* at 74.

⁴¹⁶ 40 C.F.R. 268.35(d).

⁴¹⁷ 40 C.F.R. 268.42, Table 3.

⁴¹⁸ 40 C.F.R. 268.35(d) & (h).

⁴¹⁹ OTA(1989), *supra* note 389, at 69.

EPA has yielded to pressure from waste generators,⁴²⁰ and has issued a regulation that allows small quantity generators to store their mixed wastes onsite provided they manage them soundly.⁴²¹ NRC has also issued two policy statements establishing standards and procedures for exempting very low-level radioactive wastes, the so-called "below regulatory concern" (BRC), from disposal regulations.⁴²²

6. CERCLA AND THE PRICE-ANDERSON ACT: EVIDENCE OF LINKAGE BETWEEN LIABILITY AND INSURANCE?

6.1. CERCLA

While RCRA sets the standards for waste disposal, CERCLA⁴²³ prescribes strict, unlimited, and retroactive⁴²⁴ liability for actors involved in waste management and creates an \$8.5 billion fund, the Hazardous Substance Superfund, to clean up hazardous waste disposal sites.⁴²⁵ The Superfund is financed by taxes on chemical and oil importing companies and by taxes on general revenues. It is also frequently replenished because each time EPA cleans up a hazardous waste site it recovers its costs from the private responsible parties.⁴²⁶

⁴²⁰ 56 Fed. Reg. 42730 (Aug. 29, 1991).

⁴²¹ The facility should have an inventory of the mixed waste storage areas, records of the mixed waste handled, and a mixed waste minimization plan. The generator should be able to document that she has made good faith efforts to determine the availability of treatment facilities. *Id.*

⁴²² NRC derives the authority to enact such regulations from 42 U.S.C. §2021(j). The initial policy statement established a threshold individual dose of 1–10 millirem per year. However, it was emphasized that a one millirem dose would expedite the granting of petitions, while higher doses may require more extensive justification. *See* 51 Fed. Reg. 30839 (Aug. 29, 1986). The subsequent policy statement increased the threshold dose for individuals to 10 millirem per year, and established an interim dose standard of 1 millirem per year for widespread practices involving potential exposures of larger portions of the population until more information is available on the accumulated effects of different exposures. *See* 55 Fed. Reg. 27522 (July 3, 1990).

NRC's latest policy statement has been criticized by some scientists within NRC that worked on it. Critics contend that NRC should establish one millirem per year as the threshold dose for granting BRC petitions and that it should decrease the 1000 person-rem collective standard to 100 person-rem, in accordance with the current international regulations. *See* Additional Views of Commissioner Curtiss, Committee Approves Bill to Allow States to Control Nuclear Wastes, BNA, Daily Report for Executives, Oct. 3, 1991, at A-14 (Lexis, Nexis, Omni File).

⁴²³ CERCLA was first enacted in 1980. It was amended by the Superfund Amendment and Reauthorization Act in 1986 (SARA). Both these acts are referred to as "CERCLA," or as "CERCLA as amended by SARA," 31 U.S.C. §§9601–9675 (1986).

⁴²⁴ Retroactive liability extends liability to past mismanagement of hazardous wastes when no regulations regarding sound disposal were in existence. *See, e.g.,* *United States v. Northeastern Pharmaceutical & Chemical Co.*, 810 F.2d 726 (8th Cir. 1987); *New York v. Shore Realty Corp.*, 759 F.2d 1032 (2d Cir. 1985).

⁴²⁵ 42 U.S.C. §9611(a).

⁴²⁶ 42 U.S.C. §9604.

Often, however, the discovery and apportionment of liability among responsible parties entail time-consuming and very expensive settlement⁴²⁷ and litigation procedures which involve hundreds of parties.⁴²⁸

Under CERCLA, four categories of persons are strictly liable for releases or threatened releases of hazardous waste from a disposal facility: the current owner of a disposal facility, the owner or operator of a facility at the time of disposal,⁴²⁹ the generators of hazardous wastes disposed of at a facility, and the transporters of hazardous wastes.⁴³⁰ Their liability includes all costs of removal or remedial action at hazardous waste sites⁴³¹ incurred by the federal or state government, and all other necessary response costs incurred by any other person. The costs of removal and remedial action must be consistent with the National Contingency Plan (NCP).⁴³² Liability also includes all damages resulting from destruction or damage to national resources.⁴³³ Consequently, liability under CERCLA covers damages to property and to the environment, but not personal injuries.⁴³⁴ Liability under CERCLA can be characterized as virtually absolute because the defenses provided are very limited.⁴³⁵ Furthermore, the courts have taken an expansive approach in inter-

⁴²⁷ 42 U.S.C. §9622 (this section specifies that the government can enter into a Consent Decree under which Potential Responsible Parties (PRPs) have to reimburse it for response costs incurred, or the PRPs agree to undertake response measures themselves. In extraordinary circumstances, these settlements may include a covenant not to sue the PRPs).

⁴²⁸ OTA, *Coming Clean: Superfund Problems Can Be Solved* 28-29 (1989).

⁴²⁹ See 42 U.S.C. §9601(20)(A). The term "owner or operator," according to the act, does not include "a person, who, without participating in the management of a ... facility, holds indicia of ownership primarily to protect his security interest in the facility." Despite this provision, courts have held lenders liable under the act. In *United States v. Maryland Bank & Trust*, 632 F. Supp. 573 (D. Md. 1986), the court found a foreclosing lender liable under the act. But see *United States v. Mirabile*, 15 Env'tl. L. Rep. (Env'tl. L. Inst.) 20994 (E.D. Pa. Sept. 6, 1985) where the court held that lenders that had foreclosed were not liable because they did not participate in the operation of the facility but only in the financial decisions. But see also *United States v. Fleet Factors*, 901 F. 2d 1550 (11th Cir. 1990), holding that "[i]t is not necessary for the secured creditor actually to involve itself in the day-to-day operations of the facility in order to be held liable ... [n]or is it necessary for the secured creditor to participate in the management decisions relating to hazardous waste. Rather, a secured creditor will be liable if its involvement with the management of the facility is sufficiently broad to support the inference that it could affect hazardous waste disposal decisions if it so chose." See also *New York v. Shore Realty Corp.*, 759 F. 2d 1032 (2d Cir. 1985).

⁴³⁰ 42 U.S.C. §9607(a)(1)-(4).

⁴³¹ Removal costs cover the short-term responses in cases of emergency at a disposal site. Remedial costs are the long-term clean-up costs. See 42 U.S.C. §9601(D)(23)-(24).

⁴³² 42 U.S.C. §9605.

⁴³³ 42 U.S.C. §9607(a)(4).

⁴³⁴ Despite the fact that the statute does not cover personal injuries, certain courts have allowed medical monitoring damages to be recovered as response costs. See, e.g., *Brewer v. Ravan*, 680 F. Supp. 1176 (M.D. Tenn. 1988). But see also *Keister v. Vertack Chemical Corp.*, 21 Env'tl. L. Rep. (Env'tl. L. Inst.) 20,677 (E.D. Ark. 1990).

⁴³⁵ In order not to be held liable, the defendant should establish by a preponderance of the evidence that the release or threat of release was a result of an act of God, an act of war, or a party with which the defendant has a contractual relationship other than an employee or agent

preting those defenses. Thus, the government's burden of proof is limited to proving: the existence of a facility; release of hazardous wastes from the facility; and a defendant, which can be any of the persons held liable under CERCLA.⁴³⁶ The courts have also imposed joint and several liability on defendants when the harm caused is indivisible.⁴³⁷ This is the case in most hazardous waste disposal sites where, because drums are crowded together, it is virtually impossible to identify the extent to which a particular defendant has contributed to the contamination of the surrounding environment and groundwater.

RCRA provides for compulsory insurance of owners and operators of hazardous waste facilities⁴³⁸ during the time of operation and for thirty years after the closure of the facility. The insurance must cover all property damages and personal injury claims resulting from sudden accidental occurrences and non-sudden accidental occurrences. In the event that insurance is not available, letters of credit, surety bonds, trust funds, corporate guarantees or self-insurance can be used to demonstrate financial accountability.⁴³⁹

6.2. *The Causes and Aftermath of the Insurance Crisis*

By the mid to late 1980s, the imposition of strict, retroactive, joint and several liability by CERCLA, in combination with an excessive numbers of environmental claims, led many insurance companies to withdraw comprehensive general liability (CGL) insurance covering both accidental and gradual environmental harm.⁴⁴⁰ Instead, the insurance companies started providing insurance only for one year and only for sudden pollution arising out of an incident occurring during that year.⁴⁴¹ In this manner, insurance companies hoped to evade liability for the past mishaps of their policyholders. In most cases, however, courts have interpreted the letter of insurance contracts broadly, and have held insurers liable for all types of pollution, sudden as well as gradual, as long as the harm was not intentional.⁴⁴² The uncertainty created

of the defendant. In the latter case, the defendant has to prove that she exercised due care, and that she took precautions against foreseeable acts or omissions of any such third party and the consequences that could foreseeably result from such acts or omissions. *See* 42 U.S.C. §9607(b).

⁴³⁶ F. Anderson, D.R. Mandelker and A.D. Tarlock, *Environmental Protection: Law and Policy* 616 (1990) [hereinafter *Environmental Protection*].

⁴³⁷ *See, e.g., United States v. Chem-Dyne Corp.*, 572 F. Supp. 802 (S.D. Ohio, 1983); *State of Colorado v. ASARCO, Inc.*, 608 F. Supp. 1484 (D. Colo. 1985).

⁴³⁸ RCRA §3004(a), 42 U.S.C. §6924(a); 40 C.F.R. 264.147(a)-(b). It is also clarified that RCRA's financial responsibility provision does not limit any other statutory, contractual or common law liability of an insurer, including its obligation to act in good faith in its dealings with the insured. *See* RCRA §3004(t), 42 U.S.C. §6924(t).

⁴³⁹ *Id.*

⁴⁴⁰ *Environmental Protection*, *supra* note 436, at 610.

⁴⁴¹ *Id.* at 611.

⁴⁴² Abraham, *Environmental Liability and the Limits of Insurance*, 88 *Columbia Law Review* 942, 963-73 (1988).

by the broad judicial interpretation of insurance contracts rendered insurance virtually unavailable.⁴⁴³ However, it was not only insurance availability for hazardous wastes that declined. Simultaneously, insurance premiums for medical malpractice and products liability soared.⁴⁴⁴ As a result, corporations were forced to self-insure through "industry wide mutuals"⁴⁴⁵ or "go bare," that is, operate without any insurance.⁴⁴⁶

The insurance crisis has provoked severe criticism of the tort system. Critics, however, do not attribute the insurance crisis to strict and unlimited liability. They maintain, instead, that the insurance crisis is rooted in courts' broad interpretation of the coverage of insurance policies.⁴⁴⁷ Critics also claim that courts have failed to distinguish between liability levels that deter irresponsible corporate behavior and high liability levels that do not deter,⁴⁴⁸ render insurance unavailable, drive useful companies out of the market, hamper innovation⁴⁴⁹ and international competitiveness,⁴⁵⁰ and possibly spur illegal practices.⁴⁵¹ In other words, critics blame, for the insurance crisis, not strict and unlimited liability *per se*, but the fashion it was interpreted by the United States courts that awarded large amounts of compensation and punitive damages which increased the uncertainty in the insurance market.

⁴⁴³ See *id.* at 944. See GAO, Hazardous Wastes: The Cost and Availability of Pollution Insurance 4 (GAO/PEMD-89-6, ed. 1988).

⁴⁴⁴ Some commentators have attributed the insurance crisis to the alternation of hard and soft markets that are characteristic of the insurance business. According to this view, limiting liability or caps on awards will not alter insurance availability. See, e.g., Lipsen, The Evolution of Products Liability as a Federal Issue, in Tort Law and the Public Interest 247 (Schuck ed. 1991) [hereinafter Public Interest].

⁴⁴⁵ See Priest, The Current Insurance Crisis and Modern Tort Law, 96 Yale Law Journal 1521, 1570, 1577 (1985) (Priest calls the mutuals created because of unavailability of insurance, for example, in the area of hazardous waste and railroad transportation high-risk mutuals. On the contrary, "low-risk mutuals are formed because their members find being pooled with the high-risk more costly than its worth.").

⁴⁴⁶ Sommerfield, Going Bare, Institutional Investor, Mar. 1990, at 99 (Lexis, Nexis, Omni File).

⁴⁴⁷ See, e.g., W.K. Viscusi, Reforming Products Liability 28, 50 (1991).

⁴⁴⁸ See Priest, *supra* note 445, at 1538. ("The economic effects of steadily increasing provider liability thus are quite simple in structure. A liability rule can compel providers of products and services to make investments that reduce the accident rate up to the level of optimal (cost-effective) investments. After providers have invested optimally in prevention, however, any further assignment of liability affects only the provision of insurance.").

⁴⁴⁹ Huber and Litan, Overview, in Liability Maze 1, at 16 (Huber and Litan eds. 1991) (statistical analysis has "found that for industries with relatively low liability costs the liability system appeared, if anything, to enhance innovation. But in industries such as general aviation, in which liability costs rose sharply during the early 1980s and became significant share of total costs, liability does seem to have dampened innovation.").

⁴⁵⁰ Besharov, Forum Shopping and Forum Skipping, and the Problem of International Competitiveness, in New Directions in Liability Law 139 (Olson ed. 1988).

⁴⁵¹ P. Huber, Liability: The Legal Revolution and Its Consequences 165 (1988) [hereinafter The Legal Revolution]. ("Providers who are illegal, anonymous, or too small to bother will also gain a competitive edge over established and reputable providers every time the liability vise is tightened.").

According to the critics of the tort system, because strict and unlimited liability is not at the source of the insurance crisis, its abolition is not the remedy. Therefore, they contend, state statutes that attempt to set limits on liability, or reinstate the fault principle, will fail to relieve the uncertainty of the insurance market.⁴⁵² In addition, liability limits for each type of injury would be extremely inflexible and incapable of taking into account the particularities of individual cases. Even the most vehement critics of the tort system consider liability ceilings "desperate responses, impelled by juridical inflation that has exceeded all bounds that private insurance can accommodate."⁴⁵³

In fact, state efforts to stimulate the insurance market in response to the insurance crisis by introducing caps on liability awards have not significantly affected insurance availability. For example, empirical studies have demonstrated that measures to limit liability, such as caps on awards or granting immunities to defendants, have reduced insurance costs in medical malpractice cases.⁴⁵⁴ But in the case of general liability, it is not caps, but restrictions on noneconomic and punitive damages and modifications of the joint and several liability doctrine that have reduced insurance costs.⁴⁵⁵ That limits on liability have affected malpractice insurance, but not general insurance, has been attributed to the fact that the malpractice insurance crisis was a crisis of price, while the general liability insurance crisis was a crisis of availability.⁴⁵⁶

Moreover, in the empirical studies mentioned above, for both medical malpractice and general liability, reduction of insurance costs has not reduced insurance premiums; it has increased insurance premiums, but less dramatically in states where tort reforms have been enacted.⁴⁵⁷ The inability of statutory tort reforms to lower insurance premiums has been attributed to insurers' conviction that the success of statutory reforms depends on judicial interpretation.⁴⁵⁸

Additionally, predictions that the present tort system would harm innovation and the competitiveness of American industry in international markets have not proven true. The performance of the United States chemical industry in international markets has not been affected by the allegedly excessive

⁴⁵² Priest, *supra* note 445, at 1532-34. See also Abraham, *supra* note 442, at 976.

⁴⁵³ The Legal Revolution, *supra* note 451, at 202.

⁴⁵⁴ Blackmonn and Zeckhauser, State Tort Reform Legislation: Assessing Our Control of Risks, in Public Interest, *supra* note 444, at 272, 279. Trebilcock, Dewees and Duff, Malpractice Liability: A Crosscultural Perspective, in Public Interest, *supra* note 444, at 207, 217 (caps on awards reduced claims severity by about twenty-three percent).

⁴⁵⁵ Blackmonn and Zeckhauser, *id.* at 277. The authors do not clarify what kinds of insurance are included in the broad category "general liability insurance." The study makes it difficult to identify what exact type of reform caused what reduction of insurance costs because it frequently includes similar, but not identical, tort reforms under a general category.

⁴⁵⁶ Danzon, Malpractice Liability: Is the Grass on the Other Side Greener?, in Public Interest, *supra* note 444, at 176, 180.

⁴⁵⁷ Blackmonn and Zeckhauser, *supra* note 454, at 287.

⁴⁵⁸ See Romano, Corporate Governance in the Aftermath of the Insurance Crisis, in Public Interest, *supra* note 444, at 151, 158.

liability costs.⁴⁵⁹ On the contrary, American chemical industries are significantly more innovative⁴⁶⁰ than Japanese and Western European chemical industries.⁴⁶¹ Products liability does not seem to preoccupy American corporate executives as much as do the general economic environment, taxation, the stigmatizing effects of punitive damages and hazardous waste regulations.⁴⁶² In other words, liability or a particular standard of liability – strict liability or negligence – does not by itself influence deterrence, safety and innovation. Concerns about reputation and a mix of liability and regulatory rules are more effective deterrents.⁴⁶³ Often strict liability in combination with regulation has forced industry to invest in environmentally benign products. The efforts of the industry to develop alternatives to chlorofluorocarbons (CFCs) are well known. After the Bhopal disaster, certain chemical companies have reduced the amount of hazardous chemicals they store onsite or the amounts they use.⁴⁶⁴ Other times, stringent legislation has driven polluting industries out of the market and has spurred the development of new industries willing to produce safer products or services.⁴⁶⁵ In the area of hazardous wastes, the chemical industry has started to realize that the regulatory and liability rules will equip it with a competitive advantage over other industries with little experience in handling chemical substances.⁴⁶⁶ Fluor, for instance, a uranium mining company, uses a modification of its computer program for mining to excavate underground contaminants, and to extract and treat contaminated groundwater.⁴⁶⁷ Betchel is another company that used to construct oil refiner-

⁴⁵⁹ Johnson, *The Impact of Liability on Innovation in the Chemical Industry*, in *Liability Maze*, *supra* note 449, at 428, 431. (“According to a recent report, ‘while the U.S. has posted massive overall trade deficits for many years, this country’s chemical trade surplus reflects the technology, research and marketing expertise that give the industry competitive advantage in many high valued products.’ The report goes on to say that American chemical companies are very attractive to foreign investment ... and that foreign chemical companies view the American market as the biggest and most promising for chemical products.”).

⁴⁶⁰ In other industries, however, like pharmaceuticals and small aircrafts industries, liability has dampened innovation. *See, e.g.,* Lasagna, *The Chilling Effect of Product Liability on New Drug Development*, in *Liability Maze*, *supra* note 449, at 334; Martin, *General Aviation Manufacturing: An Industry Under Siege*, in *Liability Maze*, *supra* note 449, at 478.

⁴⁶¹ *See* Johnson, *supra* note 459, at 433.

⁴⁶² *Id.* at 435.

⁴⁶³ Huber and Litan, *supra* note 449, at 12. *See also* Johnson, *supra* note 459, at 449. However, while concerns about reputation can influence transnational corporations and small reputable firms, they cannot influence speculative small enterprises. *See* B. Fisse and J. Braithwaite, *The Impact of Publicity on Corporate Offenders* 242 (1983).

⁴⁶⁴ Ashford and Stone, *The Impact of Liability Law on Safety and Innovation*, in *Liability Maze*, *supra* note 449, at 367, 400 (the authors mention numerous examples where industries changed practices because of public outcry after disasters or more stringent legislation).

⁴⁶⁵ Ashford and Stone, *id.* at 417–18.

⁴⁶⁶ Efron and Gomez, *Cleaning-Up on Clean-Ups*, *L.A. Times*, Sept. 15, 1991, at D1, col. 2 (Lexis, Nexis, Omni File).

⁴⁶⁷ *Id.*

ies, but now assists in cleaning them up. The company was hired by Saudi Arabia to clean up the Gulf spill.⁴⁶⁸

Despite these encouraging developments, it has been estimated that the existing liability system does not effectively deter corporations. For immediately manifested injuries due to chemical exposure, the overall liability costs of the chemical industry represent no more than 70 percent of the corresponding social costs.⁴⁶⁹ For chronic diseases due to chemical exposure, liability costs represent no more than 5 percent and often less than 0.1 percent of the corresponding social costs.⁴⁷⁰ Among the causes of this underdeterrence are the difficulties of identifying chemical exposure, and the complexity of verifying, by a preponderance of the evidence,⁴⁷¹ the causal linkage between exposure and disease.⁴⁷² Even in circumstances where courts have relaxed the causation standard,⁴⁷³ the compensation awarded is very small.⁴⁷⁴ Courts have been concerned that the relaxation of the causation standard in the absence of reliable epidemiological studies may over-compensate plaintiffs

⁴⁶⁸ *Id.*

⁴⁶⁹ Ashford and Stone, *supra* note 464, at 417.

⁴⁷⁰ *Id.*

⁴⁷¹ In the notorious Agent Orange litigation, the court ruled that the linkage between exposure and disease must be proven by a probability greater than 50 percent. *See In re "Agent Orange" Prod. Liab. Litig.*, 597 F. Supp. 740 (E.D.N.Y. 1984), *aff'd*, 818 F. 2d 145 (2nd Cir. 1987). *See also Parker v. Employers Mutual Liability Ins. Co. of Wisconsin*, 440 S.W. 2d 43 (Tex. 1969). Courts have also refused to grant awards where other synergistic factors could have contributed to the disease. This is because science has not advanced enough to quantify the degree of susceptibility to a future illness due to chemical exposure. *See Gardner v. Hecla Mining Corp.*, 431 P.2d 764 (Utah, 1967). In addition, courts have been reluctant to award damages for increased risk of future injury because of exposure to harmful substances at waste sites. *See, e.g., Wilson v. Johns-Mansville*, 684 F. 2d 111 (D.C. Cir. 1982); *Anderson v. W.R. Grace & Co.*, 628 F. Supp. 1219 (D.Mass. 1986); *Sterling v. Velsicol Chemical Corp.*, 855 F. 2d 1188 (6th Cir. 1988).

⁴⁷² Ashford and Stone, *supra* note 464, at 414.

⁴⁷³ For example, courts have been willing to award damages for fear of future illness ("cancerphobia") due to present injury from chemical exposure. *See Payton v. Abbott Labs*, 437 N.E. 2d 171 (Mass. 1982). Certain courts have even relaxed the standard of "present injury" and simply demand "present impact," or "reasonable fear" of developing a disease (*Stites v. Sundstrand Heat Transfer*, 660 F. Supp. 1516 (W.D. Mich. 1987)) or serious emotional distress which is both "severe and debilitating," (*Paugh v. Hanks*, 451 NE. 2d 759 (Ohio, 1983)). Courts are also increasingly willing to grant damages for costs of medical monitoring when there is a relative increase in the chance that the disease will occur and early diagnosis will mitigate its effects. *See Ayers v. Jackson Township*, 525 A.2d 287 (N.J. 1987). *See also In re Paoli Railroad Yard PCB Litigation*, 916 F. 2d 829 (3rd Cir. 1990). In awarding damages courts have relied on medical expert testimony (*Ferebee v. Chevron Chemical Co.*, 736 F. 2d 1529 (D.C. Cir. 1984)) and epidemiological studies. However, courts have rejected medical testimony and epidemiological evidence based on animal studies. *See Agent Orange, supra* note 471; *Richardson v. Richardson-Merrell, Inc.*, 857 F. 2d 823 (D.C. Cir. 1988).

⁴⁷⁴ *Sterling v. Velsicol Chemical Corp.*, 855 F. 2d 1188 (6th Cir. 1988). The district court granted damages ranging from \$50,000 to \$250,000. The court of appeals reduced a \$250,000 award to \$18,000 and the highest award granted was \$72,000.

at the expense of the defendants.⁴⁷⁵ On the other hand, denying damages because of a lack of epidemiological studies may under-compensate accident victims. Because of the general reluctance of courts to loosen the causation standard, and the ensuing underdeterrence of the chemical industry, it has been claimed that caps on awards will eventually discourage the creation of safer products and services,⁴⁷⁶ and that tort reform should be oriented towards expanding rather than limiting liability.⁴⁷⁷ As demonstrated, the insurance crisis has been attributed to the uncertainty created by judicial decisions – which made unpredictable the level of damages – rather than to the lack of liability ceilings. Moreover, empirical studies have demonstrated no linkage between caps on liability and insurance availability. These reasons and the fact that the tort system underdeters the chemical industry compel reconsideration of the position that limited liability will boost insurance markets.

Today, the shortage of traditional insurance for environmental harms has created a blooming market for alternative insurance.⁴⁷⁸ Companies increasingly discover that, because they are more knowledgeable about their risks than insurers, they are better insurers of risks giving rise to big claims.⁴⁷⁹ Therefore, rather than paying premiums to traditional insurance companies, they have chosen to develop alternative types of insurance.⁴⁸⁰ An alternative to traditional insurance is to pay claims as they arise.⁴⁸¹ Another is to create reserves by establishing subsidiary companies, the so-called “captives,” into which premiums are paid.⁴⁸² A third one, used mostly by small enterprises, is to form mutual insurance companies.⁴⁸³ In fact, commentators believe that by the year 2000 self-insurance in the form of captives or mutuals will be

⁴⁷⁵ Even commentators that support probabilistic causation – that courts should rely on statistical analysis based on the facts of the particular and previous similar exposures – concede that such an approach may over-compensate or under-compensate pollution victims. See Robinson, Probabilistic Causation and Compensation for Tortious Risk, XIV *Journal of Legal Studies* 779, 786 (1985).

⁴⁷⁶ Ashford and Stone, *supra* note 464, at 398.

⁴⁷⁷ *Id.* at 419 (“the recent demands for widespread tort reform ... tend to miss their mark, since significant underdeterrence in the system already exists. Thus proposals that damage awards be capped, that limitations be placed on pain and suffering and punitive damages, and that stricter evidence be required for recovery should be rejected. On the contrary, the revisions of the tort system should include relaxing the evidentiary requirements for recovery, shifting the basis of recovery to subclinical effects of chemicals, and establishing clear causes of action where evidence of exposure exists in the absence of manifest disease. Other tort claims may also be entertained, but they must increase the amount of deterrence in the system, not further weaken the signals sent to the firm.”).

⁴⁷⁸ Alternative Insurance, *Economist*, Sept. 26, 1992, at 94.

⁴⁷⁹ Against Insurance: Governments Should Let Insurers Live or Die on Their Own Merits, *Economist*, Sept. 26, 1992, at 18.

⁴⁸⁰ See *supra* note 478.

⁴⁸¹ *Id.*

⁴⁸² *Id.* (these captives may be run by traditional insurers. In many cases, however, the management of captives is undertaken by insurance brokers).

⁴⁸³ *Id.*

the prevailing type of insurance worldwide.⁴⁸⁴ It is currently estimated that captives all over the world have assets worth \$23–24 billion. Premiums paid to mutuals were also estimated to be \$270 million by the end of 1988, and double that amount by the end of 1991.⁴⁸⁵

The lack of casual linkage between unlimited liability and insurance availability and the potential of alternative insurance should dissipate concerns about establishing unlimited liability at the international level.

6.3. *The Price-Anderson Act*

The experience of the nuclear industry underscores the view that liability ceilings cannot guarantee insurance availability and financial viability for corporations. The Price-Anderson Act as amended in 1988 provides for limited liability of operators of commercial nuclear power plants,⁴⁸⁶ and completely shields DOE contractors from liability in the event of a “nuclear incident.”⁴⁸⁷ When first enacted, the act contained a liability ceiling of \$500 million – \$60 million contributed by private insurance companies and the remaining by public funds.⁴⁸⁸ This unique arrangement was undoubtedly due to the United States eagerness to explore the peaceful and military uses of nuclear power combined with the reluctance of private insurance companies to undertake the full costs of compensation in the event of a nuclear disaster.⁴⁸⁹ The 1988 amendment of the act did not eliminate the liability limit. Despite the significant setbacks of the nuclear industry and the end of the cold war, the liability ceiling remains, although it has been increased significantly to \$7 billion.⁴⁹⁰

In spite of the liability ceilings prescribed by the Price-Anderson Act, insurance for nuclear power plants in traditional insurance markets remains unavailable. Limited liability has been unable to prevent the decline of the nuclear industry.⁴⁹¹ In the United States, the nuclear industry is currently

⁴⁸⁴ *Id.*

⁴⁸⁵ *Id.*

⁴⁸⁶ 42 U.S.C. §2210 *et seq.* (1988). The United States Supreme Court has upheld the constitutionality of limits on the liability of operators of nuclear power plants. *See Duke Power Co., v. Carolina Environmental Study Group, Inc.*, 438 U.S. 59 (1978).

⁴⁸⁷ Nuclear incident is defined as an occurrence, including an extraordinary nuclear occurrence, taking place within the United States and causing bodily injury, sickness, disease, death, loss of or damage to property, or loss of use of property within or outside the United States. *See* 42 U.S.C. §2014(q).

⁴⁸⁸ 42 U.S.C. §2210(e) (1982).

⁴⁸⁹ Berkovitz, *Price Anderson Act: Model Compensation Legislation? The Sixty-Three Million Dollar Question*, 13 *Harvard Environmental Law Review* 1, 6 (1989).

⁴⁹⁰ *See* 42 U.S.C. §2210(e), and 42 U.S.C. §2210(b). *See also* Rosenthal (Note), *How the Price-Anderson Act Failed the Nuclear Industry*, 15 *Columbia Journal of Environmental Law* 121, 123 (1990).

⁴⁹¹ *Nuclear's Fall From Favour*, *Economist*, Nov. 21, 1992, at 18.

in retreat.⁴⁹² The public opposition against nuclear energy has annulled any possible incentive for the construction of nuclear plants provided by limited liability. Additionally insurance industries have suggested that liability limits stifle demand for liability coverage since as long as utilities are protected by liability limits they do not have any incentives to purchase more coverage.⁴⁹³ Despite the absence of traditional insurance for nuclear power plants, the nuclear industry has secured coverage through alternative forms of insurance, such as insurance pools and mutuals.⁴⁹⁴ Today nuclear plant operators can obtain over \$2 billion coverage per reactor from alternative insurance sources.⁴⁹⁵

⁴⁹² See, e.g., D. Borson, K. Bossong, G. Davis, C. Manuel, N. Rader and S. Saleska, *A Decade of Decline* (Public Citizen ed. 1989). See also *Nuclear Power: Losing its Charm*, *Economist*, Nov. 21, 1992, at 21.

⁴⁹³ Anderson, *The Dangers of Nuclear Liability Limits*, *Best's Review*, Mar. 18, 1987, at 12 (Lexis, Nexis, Omni File).

⁴⁹⁴ Three insurance pools provide insurance for nuclear industry: American Nuclear Insurers (ANI) (pool of 90 member insurance companies, insuring one-half of 110 nuclear plants), Mutual Atomic Energy Liability Underwriters (MAELU), and MAELRP Reinsurance Association which reinsures 100 percent of MAELU policies. Utility companies have also formed mutuals: Nuclear Mutual Ltd., and Nuclear Electric Insurance Ltd. For more details on the insurance available for the nuclear industry, see Dauer, *ANI Unveils New Nuclear Power Covers*, *The National Underwriter Company*, May 13, 1991, at 23 (Lexis, Nexis, Omni File). See also Perez, *Nuclear Energy Touted as Long-Term Option*, *Best's Review*, May 1989, at 112 (Lexis, Nexis, Omni File); U.S., *Nucleonics Week*, April 6, 1990, at 12 (Lexis, Nexis, Omni File).

⁴⁹⁵ This is a significant increase in comparison with \$300 million insurance coverage available in 1979 when the Three Mile accident occurred.

CHAPTER 6

Bans and the Principles of Proximity and Self-Sufficiency: The European Community Experimentation with Waste Management

This Chapter reviews the European Community waste legislation and the pertinent decisions of the European Court of Justice. It also analyzes the potential effects of the proposed liability directive on insurance availability in the European insurance market.

1. A COMPREHENSIVE APPROACH TO WASTE MANAGEMENT

The 1990s Community waste legislation has abandoned the flexible approach of the 1970s and 1980s, and resembles strongly the command and control legislation of the United States. The change of legislative style was prompted by the failure of Member States to implement Community environmental legislation. Accordingly, the Community legislation, like the United States legislation, has imposed deadlines attenuated with exceptions for Member States lacking the economic and technological capability to comply immediately. In other instances, the Commission, instead of proposing directives, has proposed regulations – legislative instruments that become national law without requiring action on the part of Member States. Other elements of the new Community legislation include more stringent monitoring mechanisms and a comprehensive approach to waste management. While the previous waste directives were conceived as fragmented pieces of legislation unrelated to one another, the 1990s directives have been envisioned as part of a larger legislative plan for waste management.

1.1. *The Framework and Hazardous Waste Directives*

The 1975 waste Directive,¹ and the 1978 hazardous waste Directive² were

¹ Council Directive 75/442 of 15 July 1975 on waste, OJ L 194/39 (1975) [hereinafter 1975 Directive].

² Council Directive 78/319 of 20 March 1978 on toxic and dangerous waste, OJ L 84/43 (1978) [hereinafter 1978 Directive].

amended in 1991. The 1991 amendments³ bring the directives closer together. The 1991 amendment of the hazardous waste Directive refers systematically to the waste Directive thus establishing the waste Directive as the Framework Directive for all wastes.⁴ The provisions of the Framework Directive apply to all directives dealing with specific wastes unless provided otherwise.⁵

The Framework Directive defines for the first time "waste" at the Community level. Annex I specifies the waste categories covered by the Directive and includes household wastes, products whose use has expired, and a variety of industrial wastes.⁶ The Commission is also authorized to prepare, not later than April 1, 1993, a list of wastes that belong to the categories included in Annex I.⁷ The list drafted by the Commission must be reviewed and revised periodically. Radioactive wastes are excluded from the scope of the Directive only "where they are already covered by other legislation."⁸

The definition of hazardous waste has also been improved. The 1978 Directive provided a limited list of toxic and dangerous substances that, if detected in certain quantities and concentrations, would classify wastes as dangerous. The 1991 definition is closer to the United States definition and similar in conception to the Basel definition.⁹ Under the Directive, the Commission must prepare a list of hazardous wastes.¹⁰ In deciding whether a waste should be incorporated in the list, the Commission must examine whether it possesses one or more of the hazardous characteristics listed in Annex III. The hazardous waste characteristics listed in Annex III are more numerous than those included in the United States legislation and the Basel Convention.¹¹ And certain wastes, in order to be defined as hazardous, have to present not only hazardous characteristics, but also hazardous constituents.¹² In preparing the list, the Commission must also take into account "the origin and composition

³ Council Directive 91/156 of 18 March 1991 amending Directive 75/442 on waste, OJ L 78/32 (1991) [hereinafter Framework Directive]. Council Directive 91/689 of 12 December 1991 on hazardous waste, OJ L 377/20 (1991) [hereinafter 1991 hazardous waste amendment].

⁴ See Explanatory Memorandum, at 2, in Proposal for Council Directives amending Directive 75/442 on waste, on hazardous waste, COM(88) 391 final.

⁵ *Id.* at 5.

⁶ Framework Directive, *supra* note 3, Annex I.

⁷ *Id.*, Art. 1(a).

⁸ Framework Directive, *supra* note 3, Art. 2. Other wastes excluded from the scope of the Directive are: (i) gaseous effluents emitted into the atmosphere, and "where they are already covered by other legislation ... (ii) waste resulting from prospecting extraction, treatment, and storage of mineral resources and the working of the quarries; (iii) animal carcasses and the following agricultural waste: faecal matter and other natural, non-dangerous substances used in farming; (iv) waste waters, with the exception of waste in liquid form; (v) decommissioned explosives." *Id.*

⁹ See *supra* note 137, Chapter 2.

¹⁰ 1991 hazardous waste amendment, *supra* note 3, Art. 1(4).

¹¹ See *supra* note 9.

¹² 1991 hazardous waste amendment, *supra* note 3, Annexes I.B., II. For similar United States regulations, see 40 C.F.R. 261, Appendix VIII.

of the waste and, where necessary, limit values of concentration."¹³ Any other waste that Member States consider hazardous may be included in the list.¹⁴

Both the lists of wastes and hazardous wastes can be adapted according to a procedure, analyzed in the Framework Directive,¹⁵ and embodied in all the waste directives. This procedure applies whenever the Directive needs to be amended because of scientific progress.¹⁶ This procedure will also be followed for the preparation of consignment notes, standard papers for waste transfers, and questionnaires.

The purpose of questionnaires¹⁷ is to more effectively monitor Member States compliance. Member States must report to the Commission every three years, based on a questionnaire prepared by the Commission, on their implementation measures. The Commission must, in turn, report to the Parliament.¹⁸ The Commission must additionally compare Member State hazardous waste plans, disposal and recovery methods, and make this information available to other Member States. By December 12, 1994, Member States must send to the Commission the names and addresses of their waste facilities with information on the treatment methods they apply, and the types and quantities of waste they handle.¹⁹ Such a provision could broaden the knowledge of the Commission and Member States about the capacity of existing facilities. In particular, the required comparisons between different waste management plans could increase the overall efficiency of waste movements.

As was the case with the United States legislation, monitoring and enforcement is facilitated by permits, inspections,²⁰ and record keeping.²¹ According to the Framework Directive, every disposal and recycling facility must obtain a permit.²² Recycling facilities and enterprises that dispose of their wastes onsite, however, may be exempted from permit requirements, if Member

¹³ *Id.*, Art. 1(4).

¹⁴ *Id.*

¹⁵ Framework Directive, *supra* note 3, Art. 18 (the Commission must represent to a committee composed of the Member States and chaired by the Commission a draft of the measures to be taken. The committee must deliver its opinion within the time-frame set by the chairman depending on the urgency of the subject. The committee must decide by qualified majority. If there is disagreement between the Commission and the committee, or if the committee has not decided, the Commission must without delay submit to the Council a proposal on the measures that have to be taken. The Council must decide by qualified majority. If the Council does not decide within three months after the matter was referred to it by the Commission, the Commission may adopt the proposed measures).

¹⁶ *Id.*, Art. 17.

¹⁷ *Id.*, Art. 16. 1991 hazardous waste amendment, *supra* note 3, Art. 8(1).

¹⁸ 1991 hazardous waste amendment, *supra* note 3, Art. 8(2).

¹⁹ *Id.*, Art. 8(3).

²⁰ Framework Directive, *supra* note 3, Art. 13. 1991 hazardous waste amendment, *supra* note 3, Art. 4(1).

²¹ Framework Directive, *supra* note 3, Art. 14. 1991 hazardous waste amendment, *supra* note 3, Art. 4(2)-(3).

²² The permit must cover, the types and quantities of waste to be accepted at a facility, the technical requirements, the security precautions, the disposal site and the treatment method. See Framework Directive, *supra* note 3, Art. 9(1).

States have enacted general rules for the activities²³ undertaken by these enterprises, specifying the types and quantities of wastes handled and the conditions under which the exemptions may apply.²⁴ The facilities have to register even if exempted.²⁵ Waste collectors and transporters must register as well.²⁶

Exceptions are not granted so easily under the 1991 hazardous waste amendment. The hazardous waste amendment provides that enterprises producing hazardous wastes and carrying out their disposal operations onsite cannot obtain exceptions.²⁷ If a Member State intends to exempt recycling facilities, it has to send the relevant legislation to the Commission. The Commission must consult with the other Member States, and put the matter to a vote.²⁸ Recycling is treated favorably in both Directives due to the importance attached to its advancement. The Framework Directive explicitly provides that the principal goals of waste management are waste reduction and recycling.²⁹

Member States must establish an integrated and adequate network of disposal facilities that incorporates the best available technology that does not entail excessive costs (BATNEEC).³⁰ The purpose of this network is to enable both the Community and individual states to implement the proximity and self-sufficiency principles. These principles are outlined in the Directive in a flexible manner. Self-sufficiency must be compatible with "geographical circumstances or the need for specialized installations for certain types of wastes," and the proximate facility must also be "appropriate."³¹ These

²³ The activities undertaken by these facilities must also be environmentally sound. Article 4 of the Framework Directive, *supra* note 3, provides that waste must be recycled or disposed of without causing harm to health and the environment and in particular "without risk to water, air, soil and plants and animals, without causing a nuisance through noise or odours, without adversely affecting the countryside or places of special interest." Article 4 also provides that Member States must "take the necessary measures to prohibit the abandonment, dumping and uncontrolled disposal of waste."

²⁴ *Id.*, Art. 11(1).

²⁵ *Id.*, Art. 11(2).

²⁶ *Id.*, Art. 12.

²⁷ 1991 hazardous waste amendment, *supra* note 3, Art. 3(1).

²⁸ *Id.*, Art. 3(4).

²⁹ Framework Directive, *supra* note 3, Art. 3. Article 2(2)-(3) of 1991 hazardous waste amendment, *supra* note 3, adds that a hazardous waste can be mixed with other wastes only if such mixing will improve safety during disposal or recycling.

³⁰ Framework Directive, *supra* note 3, Art. 5. 1991 hazardous waste amendment, *supra* note 3, Art. 6(1).

³¹ According to the proximity principle, wastes must be disposed of in "one of the nearest appropriate installations, by means of most appropriate methods and technologies" See Framework Directive, *supra* note 3, Art. 5. See also Community Strategy for Waste Management, A Communication from the Commission, reprinted in European Community Environmental Legislation 162 (EEC ed. 1992). The Communication was endorsed by the Council in a resolution of May 7, 1990 on waste policy, OJ C 122/8. ("Here 'the nearest' [facility] does not necessarily, in every case, mean close-by. To achieve the best possible distribution of installations, account must be taken of requirements and capacities for treatment.

qualifications, however, will not necessarily prevent a narrow interpretation of proximity and self-sufficiency principles. Such an interpretation could severely undermine environmentally sound waste transfers within the Community and waste exports. No adequate explanation is supplied in Community policy statements³² about the goals fulfilled by national and Community self-sufficiency in an interdependent world where self-sufficiency is inexistent. After all the concept of "Community" is at odds with the notion of self-sufficiency. The principles of proximity and self-sufficiency are also mutually exclusive since not all national facilities are necessarily closer to the place of generation than facilities located in other Member States or countries. In addition, the proximity principle cannot provide guidance in circumstances where many "appropriate" facilities exist, but those further away are also cheaper. The meaning of "appropriate" facility becomes particularly obscure because of the limited Community standards on sound waste management. Only recently, has the Commission proposed Directives on hazardous waste incineration³³ and land disposal.

1.2. The Draft Incineration and Landfill Directives

Like the United States legislation, the proposed incineration Directive³⁴ sets performance standards for incinerators.³⁵ The Commission decided not to apply the BATNEEC, a prevailing standard in both the Framework and municipal incineration Directives. The Commission believed that the application of BATNEEC would exclude more modern technologies and defeat the technology-forcing purpose of the Directive.³⁶ The United States experi-

The distribution of plans for reception of domestic refuse, for example, cannot be the same as for installations for disposing of halogenic chemical waste.").

³² See *id.*, Community Strategy for Waste Management. ("Ideally this kind of cooperation [among countries concerning waste management] should take place as far as possible on a worldwide basis. For the moment, however, waste arising within the Community which cannot be recycled should be treated within the Community where possible and exported only in exceptional circumstances.").

³³ It has, however, enacted directives on municipal incinerators. See Council Directive 89/369 of 8 June 1989 on the prevention of air pollution from new municipal waste incineration plants, OJ L 163/32 (1989). See also Council Directive 89/429 of 21 June 1989 on the reduction of air pollution from existing municipal waste incineration plants, OJ L 203/50 (1989).

³⁴ Proposal for a Council Directive on the incineration of hazardous waste, COM(92) 9 final (including Explanatory Memorandum) [hereinafter incineration Directive].

³⁵ *Id.*, Art. 7(2) provides that "plants for the incineration of hazardous wastes shall be operated in order to achieve a complete incineration." According to the United States regulations, waste incineration plants must meet the 99.99 percent DRE requirement established by EPA on June 24, 1982. See Chapter 5, Section 1.3. Compare Art. 8 of the incineration Directive, *supra* note 34, with 40 C.F.R. 264.343(b)-(c) & 40 C.F.R. 266.104. Both the proposed Directive and United States regulations provide for emission limits. In the United States plants that use hazardous waste as fuel are called industrial furnaces. In the Community such plants are included in the category of incinerators. See 40 C.F.R. 260.10 & 40 C.F.R. 266.104. See also incineration Directive, *supra*, Art. 2(2).

³⁶ *Id.* at 4. See also *id.*, Arts. 16-17.

ence, however, indicates that technology-forcing standards do not necessarily encourage the development of more advanced technology.³⁷

Member States are required to monitor the performance of incinerators. They must ensure that measurement equipment for emissions is installed,³⁸ and approve its functioning.³⁹ If emission limits exceed those prescribed in the Directive, the operator must inform the competent authorities.⁴⁰ Incineration plants must cease operations, if they violate the established emission limits.⁴¹ There are considerable doubts, however, whether Member States will temporarily close down incinerators since this is costly and environmentally unsound.⁴²

The proposed Directive for landfill disposal⁴³ provides certain basic standards for sound landfill management. These standards are basically similar to the standards mentioned in waste management literature and the United States regulations. For example, the disposal of liquid, oxidizing, explosive or flammable wastes is prohibited.⁴⁴ Wastes that exceed certain eluate criteria cannot be landfilled unless treated.⁴⁵ There are also compatibility criteria for joint waste disposal,⁴⁶ and specific requirements for closure and post-closure care.⁴⁷

1.3. Directives on Specific Wastes

1.3.1. The Titanium Dioxide and Draft PCB Directives

The 1978 titanium dioxide Directive⁴⁸ provided a flexible approach to titanium dioxide management.⁴⁹ It required Member States to develop and submit

³⁷ See *supra* note 36, Chapter 1.

³⁸ Incineration Directive, *supra* note 34, Art. 11(1).

³⁹ *Id.* Additional monitoring mechanisms are provided: the operator must check the documents that accompany the waste and take samples to verify whether the description of the wastes is in conformity with the wastes received at her premises. *Id.*, Arts. 11(3) & 12. Member States must also annually supply the Commission with information on new incineration plants or substantial modifications of existing plants. This information must contain: the date of authorization of the incineration plant, the most important measures and/or techniques incorporated for the minimization of emissions, the operating conditions, the maximum emission limits imposed, and the results of monitoring. *Id.*, Art. 15(2).

⁴⁰ *Id.*, Art. 13.

⁴¹ *Id.*

⁴² Chapter 3, Section 1.4.

⁴³ Proposal for a Council Directive on the landfill of waste, COM(91) 102 final.

⁴⁴ *Id.*, Art. 9.

⁴⁵ *Id.*, Art. 10.

⁴⁶ *Id.*, Annex III.6.

⁴⁷ *Id.*, Arts. 12–13.

⁴⁸ Council Directive 78/176 of 20 February 1978 on waste from the titanium dioxide industry, OJ L54/19 (1978) [hereinafter 1978 titanium dioxide Directive].

⁴⁹ Titanium dioxide is used as a whitening agent in many items such as soap, paints, plastics, and paper. While titanium dioxide is non-toxic, its by-products are, and create environmental problems. Titanium dioxide was introduced as a white pigment in paints so that lead pigments could be phased out.

by July 1, 1980 programs setting targets, to be achieved by July 1, 1987, for reduction and eventual elimination of titanium dioxide pollution.⁵⁰ The Commission had, in turn, to submit to the Council a proposal for the harmonization of these programs that would improve the competition in the titanium dioxide industry.⁵¹ The standards contained in the Directive were permissive. The producing state, disposing state, and the state from whose territory the waste was dumped had to authorize the dumping.⁵² Authorizations could be granted, if certain flexible conditions were satisfied⁵³ and the disposal was subject to monitoring.⁵⁴

Despite the flexibility of the Directive, Member States failed to act.⁵⁵ The inaction of Member States prompted the adoption of more stringent legislation. Thus, the 1992 amendment of the Directive⁵⁶ is conceptually quite similar to the United States legislation.⁵⁷ It includes deadlines attenuated with exceptions when it is economically and technically difficult for states to meet the deadlines.⁵⁸

Even more stringent than the titanium dioxide Directive is the proposed amendment to the 1976 Directive on polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs).⁵⁹ While the 1976 Directive merely encourages states to prohibit uncontrolled dumping⁶⁰ and promote

⁵⁰ 1978 titanium dioxide Directive, *supra* note 48, Art. 9(2).

⁵¹ *Id.*, Art. 9(3).

⁵² *Id.*, Art. 4.

⁵³ *Id.*, Art. 5 (authorization could be granted only if "(a) the waste cannot be disposed of by more appropriate means; (b) an assessment carried out in the light of available scientific and technical knowledge shows that there will be no deleterious effect, either immediate or delayed, on the aquatic environment; (c) there is no deleterious effect on boating, fishing, leisure activities, the extraction of raw materials, desalination, fish and shellfish breeding, on regions of special scientific importance or on other legitimate uses of the waters in question.").

⁵⁴ *Id.*, Art. 8.

⁵⁵ Belgium was brought before the European Court for failing to adopt relevant legislation. *See Commission of the European Communities v. Kingdom of Belgium*, Case 68/81, 2 E.C.R. 154 (1982).

⁵⁶ *See* Council Directive 92/112 of 15 December 1992 on procedures for harmonizing the programmes for the reduction and eventual elimination of pollution caused by waste from the titanium dioxide industry, OJ L 409/11 (1992) [hereinafter 1992 titanium dioxide Directive]. This Directive amended the 89/428 Directive of 21 June 1989, OJ L 201/56 (1989). The 1989 Directive was annulled by the European Court of Justice because its legal basis was erroneous, *see infra* note 100.

⁵⁷ *See*, e.g., Chapter 5, Section 1.

⁵⁸ *See* 1992 titanium dioxide Directive, *supra* 56, arts. 5, 6, 7 & 9.

⁵⁹ Council Directive 76/403 of 6 April 1976 on the Disposal of PCBs and PCTs, OJ L 108/41 (1976).

⁶⁰ *Id.*, Art. 2.

recycling,⁶¹ the 1991 proposed amendment⁶² bans recycling,⁶³ and defines uncontrolled dumping in a more precise fashion. The amendment provides, for example, that mixing PCBs with other wastes before transportation to a disposal facility is prohibited.⁶⁴ It prohibits ocean incineration,⁶⁵ and provides specific standards for land incineration.⁶⁶ Member States are encouraged to replace PCBs, if the replacement entails less or no risks.⁶⁷ The operators of PCB disposal facilities are strictly liable, and are required to obtain compulsory insurance.⁶⁸

It will be interesting to follow whether the proposed PCB Directive will be adopted, given that it is more detailed and stringent than the Directive it would replace. It has to be kept in mind, however, that stringent legislation in combination with the increased volume of PCB wastes⁶⁹ may induce illegal disposal.

1.3.2. *The Waste Oil Directive*

The waste oil Directive⁷⁰ belongs to the old generation of Community directives. It is characterized by an absence of deadlines, detailed provisions and multi-paged annexes. Yet it is not devoid of substance. The Directive attaches priority to recycling,⁷¹ but specifies that waste oils that cannot be recycled must be burned.⁷² Combustion cannot exceed certain emission limits⁷³ and there are restrictions on the kinds of waste oils that may be recycled. Inci-

⁶¹ *Id.*, Art. 5.

⁶² Proposal for a Council Directive on the Disposal of Polychlorinated Biphenyls and Polychlorinated Terphenyls, COM (88) 559 final, reprinted in OJ C 319/57 (1988). It was subsequently amended by COM(91) 373 final, reprinted in OJ C 299/9 (1991).

⁶³ *Id.*, Art. 4.

⁶⁴ *Id.*, Art. 3.

⁶⁵ *Id.*

⁶⁶ *Id.*, Annex I (the Directive provides that incinerators must be able to destroy 99.9998 percent of PCB wastes. It also provides that incinerators should be designed so that the emissions and the waste do not contain in total more than 0.00002 percent of the quantity of PCBs treated).

⁶⁷ *Id.*, Art. 7(1)(a).

⁶⁸ *Id.*, Art. 6(3)(b).

⁶⁹ On October 1, 1985 the Council adopted Directive 85/467, OJ L 269/56 which amended Directive 76/769 of 27 July 1976, OJ L 262/201 on the approximation of the laws, regulations and administrative provisions of the Member States concerning restrictions on the marketing and use of certain dangerous substances and preparations. Both the initial and amended versions of the Directive prohibit the marketing of PCBs in concentrations of more than 100 ppm and, consequently, will increase the volume of PCB wastes and contaminated materials.

⁷⁰ Council Directive 75/439 of 16 June 1975 on the disposal of waste oils, OJ L 194/23 as amended by 87/101 of 22 December 1987, OJ L 42/43 (1987) [hereinafter waste oil Directive].

⁷¹ *Id.*, Art. 3(1).

⁷² *Id.*, Art. 3(2).

⁷³ *Id.* Article 8(1)(a) provides specific emission limits for plants with a thermal input of 3 MW or more. Article 8(1)(b) provides that combustion in plants with a thermal input of less than 3 MW must be subject to adequate control.

dents of pollution in certain Member States⁷⁴ caused by waste oils containing PCBs prompted the adoption of bans on regeneration of waste oils, if the recycled oils contain more than 50 ppm of PCBs.⁷⁵ If waste oils cannot be burned or recycled, they must be safely destroyed, stored or disposed of.⁷⁶ In case wastes cannot be disposed of safely by any other means,⁷⁷ Member States must ensure that collection and disposal facilities carry out their activities in areas designated by competent authorities.⁷⁸ Based on this provision, France adopted a system under which the country was divided into districts and each district was assigned to one collector. It was hoped that the so created monopolies and the ensuing economic benefits for collectors would encourage responsible collection and treatment.

The French legislation, however, was referred repeatedly⁷⁹ to the European Court of Justice for preliminary rulings. Through preliminary references French courts sought to clarify whether monopolies for domestic waste collectors were detrimental to intra-Community trade and the free movement of goods. The Court of Justice in *Inter-Huiles* ruled against the French legislation, arguing that "an efficient and coherent system of treatment for waste oils"⁸⁰ must not create barriers to intra-Community trade and must not harm competition. The Court also stated that exclusive rights for collection and disposal facilities within a zone must not necessarily lead to waste export prohibitions.⁸¹ The French argument that monopolies and export prohibitions provided incentives for sound waste management because they ensured profits for collectors was rejected by the Court. The Court pointed out that the Directive contemplated zoning only as a measure of last resort, and that Member States could use financial indemnities to ensure the viability of waste oil collectors or disposers.⁸²

⁷⁴ For example, in Germany the waste oil definition was very broad, and included mixtures that contained 4 percent of oil, regardless of the nature of other contaminants. As a result, PCBs were not removed in the refining process and the regenerated lubricants still contained quantities of PCBs. The public outcry against pollution caused by waste oils containing PCBs was stirred by the bankruptcy of a waste oil recycling firm that left behind it PCB contaminated facilities to be cleaned-up by the government. See Piasecki and Davis, *supra* note 157, at 4, Chapter 3.

⁷⁵ Waste oil Directive, *supra* note 70, Arts. 10(3) & 7.

⁷⁶ *Id.*, Art. 3(3).

⁷⁷ *Id.*, Arts. 2-4.

⁷⁸ *Id.*, Art. 5(2).

⁷⁹ Syndicat National des Fabricants Raffineurs d'Huile de Graissage and Others v. Groupement d'Intérêt Economique "Inter-Huiles," Case 172/82, 3 E.C.R. 557 (1983). Subsequent decisions on the same matter followed the precedent of *Inter-Huiles*. See Commission of European Communities v. French Republic, Case 173/83, 2 E.C.R. 501 (1985); Groupement d'Intérêt Economique "Phonex Alpes Huiles" and Others v. Syndicat National des Fabricants Raffineurs d'Huile de Graissage and Others, Case 295/82, 2 E.C.R. 576 (1984).

⁸⁰ Waste oil Directive, *supra* note 70, Preamble.

⁸¹ *Inter-Huiles*, *supra* note 79, at 365-66.

⁸² *Id.* at 566.

Under the Directive, Member States may grant indemnities to collection and disposal facilities.⁸³ The indemnities may be financed, in accordance with the polluter pays principle, by a charge imposed on the producers of products that become waste oils after they are used, and must not distort competition.⁸⁴

The indemnities provision came before the Court in *Procureur de la République v. Association des Brûleurs d'Huiles Usagées*.⁸⁵ The Court ruled that the indemnities provision *per se* did not jeopardize free trade since it was explicitly provided in the waste oil Directive that subsidies must not distort competition.⁸⁶ With respect to the French zoning requirement, the Court followed the precedent of *Inter-Huiles*. However, the Court upheld the French partial ban on waste burning. The French legislation prohibited burning of waste oil in small industries because such industries cannot afford purification devices and are difficult to monitor.⁸⁷ The Court based its decision on the environmental purpose of the Directive, as evidenced by the permit and inspection provisions. The Court held that free trade must not be viewed in absolute terms, and that it must be subject to limits "justified by the objectives of general interest pursued by the Community" as long as these objectives do not substantially impair free trade.⁸⁸

Both the *Inter-Huiles* and *Huiles Usagées* were decided before the entry into force of the 1984/86 Directive on waste shipments.⁸⁹ The next section will expand on the Court decisions generated by the 1984/86 Directive, the 1989 titanium dioxide Directive, and the 1991 Framework Directive.

2. REGULATING WASTE MOVEMENTS WITHIN, IN AND OUT OF THE COMMUNITY

2.1. The Court Decisions

Prior to 1993, waste movements were regulated by the 1984/86 Directive.⁹⁰ The European Court of Justice interpreted this Directive before it was replaced by a 1993 Regulation.⁹¹ The case before the Court, *Commission v. Belgium*,⁹² concerned Wallonia's waste import prohibition from other Member States and regions of Belgium.

The Court of Justice distinguished between hazardous and solid wastes. It held that Member States could not impose total bans on hazardous waste

⁸³ Waste oil Directive, *supra* note 70, Art. 14.

⁸⁴ *Id.*, Art. 15.

⁸⁵ Case 240/83, 2 E.C.R. 539 (1985).

⁸⁶ *Id.* at 550.

⁸⁷ *Id.* at 551.

⁸⁸ *Id.* at 549.

⁸⁹ See *supra* note 91, Chapter 2.

⁹⁰ *Id.*

⁹¹ See *infra* Section 2.2.

⁹² Case C-20/90 (1992) (unpublished) [hereinafter Wallonia case].

shipments because the 1984/86 Directive established a procedure – prior notification and informed consent – that governs waste movements.

With respect to solid wastes the Court admitted that wastes are goods and that article 30 of the Treaty,⁹³ which prohibits quantitative restrictions on the imports of goods, must also apply to waste imports. The Court, however, conceded that wastes, because of their effects on the environment, are commodities of atypical nature. The Court took into account the massive influx of wastes into Wallonia and concluded that such an influx constitutes a real danger to the environment because of the limited capacities of Wallonia.

The Court rejected Commission's argument that other states' wastes were not more harmful than Wallonia's and that, consequently, the Belgian legislation had discriminated against out-of-Belgium waste. The Court relied on article 130R(2) of the Treaty which provides that Community environmental action must be based on the principle that environmental damage should as a priority be corrected at the source. The Court argued that this provision implied that wastes should be eliminated as close as possible to the place of their production. In support of this argument the Court cited the Basel Convention signed by the Community, and upheld the Belgian import prohibition of solid wastes.

The Court regarding dangerous wastes followed the opinion of the advocate general. But the advocate general did not distinguish between dangerous and other wastes. The advocate general maintained that Belgium violated article 30 of the Treaty since wastes are goods for a "substantial industry."⁹⁴ Wastes are goods even if they have negative value – that is the owner is willing to pay to get rid of them – as long as they can be priced.⁹⁵ The advocate general rejected the argument that article 36 applied to the particular case because an "a priori ban on imports of waste from other Member States is clearly neither necessary nor proportionate to avert any danger to public health which might be posed" by wastes.⁹⁶ He argued that the proximity and self-sufficiency principles embodied in the Basel Convention and the 1993 Regulation (in a draft form at the time of the Court decision) are not incompatible with the free movement of goods as long as they "are applied in a Community as opposed to a purely national framework."⁹⁷

The advocate general also maintained that unilateral prohibitions were at odds with the notion of an integrated network of disposal facilities mandated by the 1991 Framework Directive since they may hinder disposal at the "nearest appropriate installation." He also claimed that self-sufficiency at the

⁹³ Treaty Establishing the European Economic Community, Mar. 25, 1957, 298 U.N.T.S. 11 [hereinafter Treaty].

⁹⁴ See Opinion of Advocate General F.G. Jacobs in Case C-2/90, *Commission v. Belgium* delivered on 10 January 1991 (unpublished) [hereinafter Opinion 10].

⁹⁵ See Opinion of Advocate General F.G. Jacobs in Case C-2/90, *Commission v. Belgium* delivered on 19 September 1991 (unpublished) [hereinafter Opinion 19].

⁹⁶ Opinion 10, *supra* note 94.

⁹⁷ *Id.*

Community and national levels should be interpreted in a manner compatible with articles 30 and 36.⁹⁸ More specifically, the advocate general argued that the self-sufficiency principle does not authorize importation bans or other quantitative restrictions and that it must, instead, be viewed as a means to reduce wastes and reliance on waste exports. This interpretation of the self-sufficiency principle was suggested, according to the advocate general, by the qualifications to the principle which allow Member States to take into account "geographical circumstances" and "the need for specialized installations."⁹⁹

An idiosyncrasy of the Community environmental legislation is that, frequently, its legal foundation is article 100A. This article does not regulate environmental issues. Rather, its purpose is to harmonize Member States legislation and, thus, to facilitate the functioning of the internal market. Harmonization measures are adopted by qualified majority voting of the Council with the cooperation of the Parliament. Cooperation of the Parliament democratizes Community decisionmaking, and qualified majority voting advances the swift adoption of legislation. These advantages of article 100A have prevented the Commission from proposing environmental legislation based on article 130S, the article explicitly relating to environmental legislation. This is because article 130S requires unanimous voting and mere consultation – not cooperation – of the Parliament.

An attempt by the European Council to use article 130S as the legal basis for the 1989 amendment of the titanium dioxide Directive failed. The Court of Justice sided with the Commission, stressing the important role of the cooperation procedure in the democratization of the Community. The Court held that the double purpose of the Directive – environmental protection and elimination of disparities in competition – must not distract from its basic intention, that is to harmonize national laws regarding production in a specific industrial sector.¹⁰⁰ The Court's decision was apparently influenced by the opinion of the advocate general¹⁰¹ which emphasized that article 100A is applicable when the purpose of the proposed legislation is to harmonize national production requirements,¹⁰² and that article 130S is suitable for the adoption of general anti-pollution legislation.¹⁰³

⁹⁸ Opinion 19, *supra* note 95.

⁹⁹ *Id.*

¹⁰⁰ See Commission v. Council, Case 300/89 (1991) (unpublished) [hereinafter titanium dioxide decision].

¹⁰¹ See Opinion of the Advocate General, M.G. Tesauro (Lexis, Europe, Cases File).

¹⁰² In support of this argument, the advocate general referred to the preparatory stages of the Directive and the statements of Community organs that the lack of harmonization of Member State legislation had led to conditions of distortion of competition in the titanium dioxide industry. *Id.*

¹⁰³ The advocate general referred to Directive 90/313 on freedom of access to information on the environment; Regulation No 1210/90 on the establishment of the European Environment Agency and the European environment information and observation network; and Directives 89/849 and 89/369 concerning air pollution from municipal waste incineration plants. *Id.*

The Court followed the same rationale, but reached a different conclusion in a decision regarding the legal basis of the 1991 Framework Directive.¹⁰⁴ The Court pointed out that the main objective of the Directive was the protection of the environment, and not the harmonization of the conditions of the internal market.¹⁰⁵ The Court distinguished this decision from the titanium dioxide decision by emphasizing the divergent purposes of the two Directives. The purpose of the titanium dioxide Directive was the harmonization of Member States legislation regarding the conditions of production in a specific industry, and that justified reliance on article 100A. The same, however, was not true with the 1991 Framework Directive, which should be more appropriately characterized as a general anti-pollution measure.¹⁰⁶ The Court made no reference to the democratic virtues of article 100A most probably because such reference would seem redundant after the ratification of the Maastricht Treaty.¹⁰⁷

The Court of Justice decisions seem to be incompatible with United States Supreme Court decisions regarding interstate waste transfers. Chapter 7 will critically evaluate the different perspectives of the two Courts and attempt to reveal important similarities behind their apparent differences.

2.2. Regulating Hazardous Waste Movements

The 1984/86 Community Directive, upon which *Commission v. Belgium* is partly based, has been replaced by a detailed Regulation.¹⁰⁸ The Regulation affirms the importance of the proximity and self-sufficiency principles both at the Community and national levels. It prescribes a considerably more specific notification procedure, and allows prohibitions and restrictions of waste movements. For example, it bans waste exports from the Community to ACP

¹⁰⁴ *Commission v. Council*, Case C-155/91 (1993) (unpublished) [hereinafter Framework Directive decision].

¹⁰⁵ See also *Parliament v. Council*, Case C-70/88 (1991) (unpublished) where the Court found that a Regulation establishing maximum limits for radioactive contamination could not be based on article 100A of the Treaty. The Court held that article 31 of the Euratom Treaty regarding the protection of populations from radioactive radiation was the proper legal foundation for the Regulation.

¹⁰⁶ The advocate general maintained that the purpose of principles of proximity and self-sufficiency is the reduction of waste movements. Reduction of waste movements could not possibly be in accordance with the liberalization of movements of goods protected in article 100A. Thus the Directive, since it does not directly affect, like the titanium dioxide Directive, specific industries, should be included in the category of general anti-pollution legislation and its adoption must be based on article 130S. See *Conclusions de l'avocat général M.G. Tesaro dans l'affaire C-155/91, Commission contre Conseil*, 1er décembre 1992 [unpublished]. An action by the Commission concerning the legal basis of hazardous waste directive is still pending. See *Commission v. Council*, Case 86/92, OJ C97 (1992).

¹⁰⁷ See Chapter 7, Section 2.

¹⁰⁸ Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community, OJ L30/1 (1993) [hereinafter Regulation]. This regulation imposes considerably more stringent controls than those proposed by the Commission in COM(90) 415 final and COM(92) 121 final.

countries regardless of the waste management method used, in accordance with the Lomé treaty.¹⁰⁹

The adoption of the Regulation was a triumph for the French policy. France, a target of illegal waste traffickers, advocated provisions that legitimize waste import bans even within the Community borders.

The Regulation has caused turmoil, especially in the recycling industry which maintains that the Regulation will harm international trade in recyclable materials. The industry has expressed concerns mainly because the Regulation is not based on the pro-trade 100A, but on 130S. The Council decided to employ article 130S so as to elicit a judicial interpretation upholding the prohibitions and restrictions included in the Regulation. Upholding bans and restrictions would have been difficult, if the Regulation was based on common market considerations. However, using article 130S as legal foundation, has thwarted the input of the European Parliament.¹¹⁰

2.2.1. Waste Transfers within the Community

2.2.1.1. *For Disposal.* Member States may take measures to prohibit waste shipments generally, partially or systematically by invoking the proximity and self-sufficiency principles, or in order to advance recycling as long as they inform the Commission.¹¹¹ Member States, however, cannot ban waste imports from states with small waste production and, consequently, insignificant waste management capacity.¹¹² States with small waste production will have to contact potential importing states. If such efforts are not fruitful, they can refer the matter to the Commission, which would have to resolve the issue by applying article 18 of the Framework Directive.¹¹³

In Member States where no prohibitions are in force, a waste shipment can take place after the prior notification and consent of the importing state. The procedure of notification of importing states is addressed in detail in the Regulation. The notifier – who can be any person in possession or control of the wastes¹¹⁴ – must notify the importing, exporting and transit states,

¹⁰⁹ Regulation, *supra* note 108, Art. 18. For more details on the Lomé Treaty, see Chapter 2, Section 2.2.

¹¹⁰ Waste: New Trade Regulation Could End Up in the Dock, Europe Environment, Europe Information Service, Mar. 2, 1993 (Lexis, Nexis, Omni File).

¹¹¹ Regulation, *supra* note 108, Art. 4(3)(a)(i).

¹¹² *Id.*, Art. 4(3)(a)(ii).

¹¹³ *Id.*, Art. 4(3)(a)(iii). See *supra* note 15.

¹¹⁴ *Id.*, Art. 2(g): "Notifier means any natural person or corporate body to whom or to which the duty to notify is assigned, that is to say the person referred to hereinafter who proposes to ship waste or have waste shipped: (i) the person whose activities produced the waste (original producer); or (ii) where this is not possible, a collector licensed to this effect by a Member State or a registered or licensed dealer or broker who arranges for the disposal or the recovery of waste; or (iii) where these persons are unknown or are not licensed, the person having possession or legal control of the waste (holder); or (iv) in the case of import into or transit through the Community of waste, the person designated by the laws of the State of dispatch or, when this designation has not taken place, the person having possession or legal control of

and the operator of the waste management facility – the consignee.¹¹⁵ The notification – in the form of a standard consignment note¹¹⁶ – must include information on the source and composition of the wastes, arrangements for routing, insurance and safe transport, and the identity of the disposal facility and original producer.¹¹⁷ The notifier must have a contract with the consignee specifying that the notifier will take the wastes back, if the shipment is not completed as planned, or if its completion violates the Regulation.¹¹⁸ The consignee must provide the notifier with a disposal certificate no later than 180 days after receipt of the wastes.¹¹⁹

After receiving the notification, the importing state must send an acknowledgement to the notifier, the exporting and transit states and the consignee.¹²⁰ The importing state must decide, within thirty days after the acknowledgement, whether it will consent, refuse, or require additional information for the waste shipment.¹²¹ It must authorize the shipment only if it does not have objections and makes sure that the other affected states do not have objections either.¹²² The exporting and transit states may also object in writing to the waste shipment,¹²³ or impose conditions on the waste transfers within their jurisdiction.¹²⁴ But these conditions must not be more stringent than those imposed on similar domestic waste shipments.¹²⁵

Under article 4(3), objections of importing and exporting states may be based on the proximity and self-sufficiency principles, and the implementation of waste management plans that account for the geographical circumstances or the need for specialized installations for certain types of wastes.¹²⁶ Exporting, importing and transit states may raise objections, if a shipment violates their environmental laws and regulations, public order, public safety, or health protection. Objections may also be based on obligations arising out of international conventions, or on the past involvement of the notifier or consignee in illegal waste trafficking.¹²⁷

the waste (holder).” According to article 3(8), the notification procedure may also be initiated by the exporting state.

¹¹⁵ *Id.*, Art. 3(1). Consignee is the person to whom the waste is shipped for recovery or disposal. *See also id.*, Art. 2(h).

¹¹⁶ *Id.*, Art. 3(3)-(4). *See also id.*, Art. 2(o).

¹¹⁷ *Id.*, Art. 3(5).

¹¹⁸ *Id.*, Art. 3(6).

¹¹⁹ *Id.*

¹²⁰ *Id.*, Art. 4(1).

¹²¹ *Id.*, Art. 4(2)(a).

¹²² *Id.*

¹²³ *Id.*, Art. 4(2)(b).

¹²⁴ *Id.*, Art. 4(2)(d).

¹²⁵ *Id.*

¹²⁶ *Id.*, Art. 4(3)(b).

¹²⁷ *Id.*, Art. 4(3)(c).

Wastes can be shipped only after the notifier receives the authorization of the state of destination.¹²⁸ Without such authorization waste transfers are illegal.¹²⁹ After receiving the authorization, the notifier must send copies of the consignment note to all the states concerned three days before the shipment.¹³⁰ The consignment note and authorization must accompany each waste shipment.¹³¹ Three days after receiving the wastes, the consignee must send a copy of the consignment note to the notifier and all affected states.¹³²

The requirement for prior authorization, the proximity and self-sufficiency principles, and the right to ban waste imports are novelties of the 1993 Regulation. The previous regime merely required acknowledgment of the receipt of notification by the importing state.¹³³ These burdensome restrictions were adopted in hope that they would minimize waste shipments and advance sound waste management. As has been demonstrated in Chapter 1, however, they are unlikely to be successful. The belief that obstacles to waste movements increase industry's willingness to behave lawfully is unrealistic because it ignores the *static* dimension of wastes, which constantly entices involvement in waste mismanagement schemes.

2.2.1.2. *For Recovery.* The Regulation follows the classification of recyclable wastes adopted in the 1992 OECD Decision.¹³⁴ According to the Decision, wastes destined for recovery are classified in three categories: green list wastes that are transferred as goods; amber list wastes that are subject to more significant controls; and red list wastes that are controlled stringently.¹³⁵ The Regulation follows the OECD Decision, but prescribes more restrictions for green list waste exports.¹³⁶

Before the shipment of amber list wastes the tacit or explicit consent of the importing country is necessary.¹³⁷ The consignment note must contain the information required when wastes are destined for disposal, as well as information on the amount of recycled material in relation to the residual waste, the method of disposal of the residual waste, and the value of the recycled material.¹³⁸ The contract between the notifier and consignee must

¹²⁸ *Id.*, Art. 5(1).

¹²⁹ *Id.*, Art. 26(1).

¹³⁰ *Id.*, Art. 5(2).

¹³¹ *Id.*, Art. 5(3).

¹³² *Id.*, Art. 5(5). See also *supra* note 119.

¹³³ 1984/86 Directive, *supra* note 89, Art. 4.

¹³⁴ See Chapter 2, Section 3.

¹³⁵ For more details on the OECD Decision, see Chapter 2, Section 4.

¹³⁶ According to article 11, *supra* note 108, information concerning green list waste transfers must include: the name and address of the holder, the usual commercial description of the waste, the quantity of waste, the name and address of the consignee, the recovery operations, and the anticipated date of shipment.

¹³⁷ The consent is considered tacit if thirty days after the acknowledgment of notification no objections have been raised. *Id.*, Art. 8(1).

¹³⁸ *Id.*, Art. 6(5).

specify the obligation of the notifier to retrieve the wastes when the contract is not executed as agreed. The contract must also provide for consignee's duty to supply the notifier with a recovery certificate.¹³⁹

The states of destination, dispatch and transit may raise objections if a shipment violates their waste management plans, environmental laws, public order, public safety or health protection. They may also raise objections if the notifier or consignee has been found guilty of prior illegal trafficking, if the recycling is not justifiable on economic and environmental grounds, or if the shipment conflicts with obligations undertaken under international conventions.¹⁴⁰

However, Member States cannot totally or systematically prohibit waste imports based on the principles of proximity and self-sufficiency. In fact, importing states may decide not to raise objections to waste shipments to a specific recovery facility, and inform the Commission accordingly.¹⁴¹ The Commission must inform the OECD and the other affected states.¹⁴² The exporting and transit countries may still object to the waste shipment or impose conditions.¹⁴³ The affected states must inform the Commission if they need to review the contract between the notifier and the consignee. In that case, they must receive the contract seven days before the shipment.¹⁴⁴

The restrictions applying to the amber list wastes apply also to the red list. But consent for red list waste shipments must always be in writing and cannot be implied.¹⁴⁵

2.2.2. Waste Exports

2.2.2.1. For Disposal. Waste exports to other countries are also prohibited except to European Free Trade Association (EFTA) countries that are parties to the Basel Convention.¹⁴⁶ Yet even exports to EFTA countries can be banned, if the EFTA country prohibits them altogether, has not given its written consent, or the exporting Member State has reason to believe that the wastes will be mismanaged in the EFTA country.¹⁴⁷

In order to export wastes, the notifier must send the notification to the exporting Member State. Copies of the notification must also be sent to the consignee and the other states concerned.¹⁴⁸ The exporting Member State must send to the notifier, within three working days, written acknowledgment

¹³⁹ *Id.*, Art. 6(6).

¹⁴⁰ *Id.*, Art. 7(4)(a)-(b).

¹⁴¹ *Id.*, Art. 9(1)-(2).

¹⁴² *Id.*

¹⁴³ *Id.*, Art. 9(3).

¹⁴⁴ *Id.*, Art. 9(4).

¹⁴⁵ *Id.*, Art. 10.

¹⁴⁶ *Id.*, Art. 14(1).

¹⁴⁷ *Id.*, Art. 14(2).

¹⁴⁸ *Id.*, Art. 15(1).

of the notification.¹⁴⁹ The notifier must provide the exporting state with the written consent of the EFTA country, confirmation of a contractual relationship between the notifier and the consignee verified by the EFTA country,¹⁵⁰ and the written consent of the states of transit.¹⁵¹ The exporting and transit states may raise objections; refuse or allow the shipment with or without conditions.¹⁵² Objections may be based on article 4(3) – on the grounds that apply for intra-Community waste shipments. The consignment note must be delivered by the carrier to the last customs office of departure within the Community.¹⁵³ After the wastes have left the Community, the customs office must send a copy of the consignment note to the competent authority which issued the authorization.¹⁵⁴ If the exporting state receives no information from the consignee, within forty-two days after the waste has left the Community, it must inform the importing country.¹⁵⁵

2.2.2.2. For Recovery. Because frequently waste exports to allegedly recycling operations end up in uncontrolled dumps, the Community prohibited all waste exports for recovery. Exports are allowed only to OECD states, state parties to the Basel Convention, or states with which the Community, or the Community and its Member States, have concluded bilateral, multilateral or regional agreements. Waste exports are also allowed to countries with a bilateral agreement with a Member State before the entry into force of the Regulation.¹⁵⁶

All the above agreements must guarantee environmentally sound waste management at an authorized facility. Agreements must also provide for the treatment of the non-recoverable portion of waste, and allow, if possible, on-the-spot examination of compliance.¹⁵⁷ They must initially be reviewed by the Commission no later than December 31, 1996. Thereafter, they must be reviewed periodically. In reviewing them the Commission must take into account the experience of the importing country and its ability to carry out sound recycling operations. The Commission must inform the Parliament and the Council on the results of its review. If the review demonstrates that

¹⁴⁹ *Id.*

¹⁵⁰ *Id.*, Art. 15(4)(b) (the contract must require the consignee to provide copies of the fully completed consignment note to the notifier and the competent authorities concerned three working days after the receipt of the wastes. The consignee must also provide a certificate of disposal in no less than 180 days after the receipt of the wastes. If the certificate is incorrect, the contract must provide that the notifier will bear the costs of taking the wastes back and soundly disposing of them).

¹⁵¹ *Id.*, Art. 15(4).

¹⁵² *Id.*, Art. 15 (2)-(3) & (5).

¹⁵³ *Id.*, Art. 15(8).

¹⁵⁴ *Id.*, Art. 15(9).

¹⁵⁵ *Id.*, Art. 15(10).

¹⁵⁶ *Id.*, Art. 16(1)(a)-(b).

¹⁵⁷ *Id.*, Art. 16(2)(a)-(c).

sound waste management is not guaranteed, the continuation of exports will be reconsidered, including the possibility of a ban.¹⁵⁸

No waste exports are allowed to countries prohibiting waste imports, not consenting to a specific import, or to countries where the exporting Member State believes the wastes will be mismanaged.¹⁵⁹

The notification procedure differs depending on the categories of wastes exported. Green list waste exports to OECD countries are not subject to any controls. The Commission must, however, provide non-OECD countries with the green list – included in Annex II of the Regulation – and request written confirmation from those countries that green list wastes are free from controls within their jurisdiction.¹⁶⁰ If green list wastes are regulated in the importing country, the Commission and the importing country must agree on the applicable measures.¹⁶¹

Amber and red list waste exports to OECD countries are governed by the intra-Community provisions for recycling. Exports of amber, red and not yet classified wastes to non-OECD countries are regulated by the intra-Community provisions for disposal.¹⁶²

2.2.3. Waste Imports

2.2.3.1. For Disposal. Waste imports are allowed, if the exporting country is party to the Basel Convention, or if it has a bilateral, regional or multilateral agreement with the Community or the Community and its Member States. Waste imports are also authorized, if the exporting country has a bilateral agreement with an individual Member State before the Regulation becomes effective.¹⁶³ Bilateral agreements concluded after the entry into force of the Regulation are valid only in exceptional cases for wastes that cannot be soundly managed in the exporting country.¹⁶⁴

The notifier must send the standard consignment note to the importing Member State, the transit state and the consignee.¹⁶⁵ The importing state may authorize or refuse the shipment, ask for additional information, raise objections or impose conditions.¹⁶⁶ Any objections must be based on article 4(3).¹⁶⁷ The importing state must send a certified copy of its decision to the transit state, the customs office of entry into the Community and the consignee.¹⁶⁸ After receiving the wastes, the consignee must send back to the

¹⁵⁸ *Id.*, Art. 16(2)(d).

¹⁵⁹ *Id.*, Art. 16(3).

¹⁶⁰ *Id.*, Art. 17(1).

¹⁶¹ *Id.*, Art. 17(3).

¹⁶² *See id.*, Art. 17(8) & Art. 15. *See also id.*, Art. 17(8) & Art. 7(4).

¹⁶³ *Id.*, Art. 19(1).

¹⁶⁴ *Id.*, Art. 19(2).

¹⁶⁵ *Id.*, Art. 20(1).

¹⁶⁶ *Id.*, Art. 20(3)-(5).

¹⁶⁷ *Id.*, Art. 20(3).

¹⁶⁸ *Id.*, Art. 20(4).

notifier the completed consignment note, and the certificate of disposal.¹⁶⁹

2.2.3.2. *For Recovery.* Waste imports for recovery are allowed only from OECD countries, state parties to the Basel Convention or states having bilateral, multilateral, or regional agreements with the Community. Waste imports are also allowed from countries with agreements with individual Member States before the application of the Regulation, as long as the Commission is notified.¹⁷⁰ Member States may also enter into bilateral import agreements with third states after the application of the Regulation only in order to avoid interruption of waste treatment already provided.¹⁷¹ Imports of recyclable wastes into the Community are restricted by the intra-Community waste trade rules for recycling.¹⁷²

2.2.4. *Common Provisions*

Aware of the delays embedded in the system of prior notification and authorization, the Community has adopted more flexible requirements for wastes of the same physical and chemical characteristics that are shipped periodically to the same consignee following the same route.¹⁷³ In that case, countries may agree to use a general notification procedure for all shipments for a maximum period of one year.¹⁷⁴

Waste transfers without the consent of the concerned states are illegal,¹⁷⁵ and the states of origin must ensure the proper disposal of wastes transferred in that manner. When the illegal trafficking is initiated by the notifier, the exporting country must repatriate the wastes.¹⁷⁶ The wastes must also be taken back whenever their disposal or recovery will violate the terms of the consignment note or the contract.¹⁷⁷

All waste shipments must be insured,¹⁷⁸ and wastes requiring different notifications must not be mixed during transportation.¹⁷⁹ Member States are required to enforce the Regulation by inspections and on-the-spot checks of the shipments.¹⁸⁰ Member States must also designate specialized customs offices for into and out of the Community waste shipments.¹⁸¹ They must submit a report to the Basel Convention Secretariat on the amount of wastes exported or imported, their destination and characteristics, on waste reduc-

¹⁶⁹ *Id.*, Art. 20(8)-(9).

¹⁷⁰ *Id.*, Art. 21(1)(a)-(b).

¹⁷¹ *Id.*, Art. 21(2).

¹⁷² *Id.*, Art. 22.

¹⁷³ *Id.*, Art. 28(1).

¹⁷⁴ *Id.*, Art. 28(2).

¹⁷⁵ *Id.*, Art. 26(1).

¹⁷⁶ *Id.*, Art. 26(2).

¹⁷⁷ *Id.*, Art. 25.

¹⁷⁸ *Id.*, Art. 27.

¹⁷⁹ *Id.*, Art. 29.

¹⁸⁰ *Id.*, Art. 30.

¹⁸¹ *Id.*, Art. 39.

tion, transportation accidents, and disposal plans that did not materialize as planned. Based on these reports the Commission must prepare a report every three years on the implementation of the Regulation.¹⁸² The Commission must also prepare a model consignment note and a model disposal and recovery certificate.¹⁸³

2.3. Regulating Radioactive Waste Movements

The radioactive waste Directive¹⁸⁴ contains no reference to the principles of proximity or self-sufficiency. This is because it is obviously environmentally unsound to require each country to become self-sufficient in radioactive waste management or develop its nuclear waste management infrastructure based on the proximity principle. Nonetheless, the Directive has not dispensed with the bureaucracy of the system of prior consent. The prior authorization system adopted in the Directive is similar to the prior notification system of the 1993 Regulation. A striking difference is that the country of origin of wastes acts as a sort of mediator between the waste holder and the country of destination probably because radioactive wastes have been mostly the responsibility of governments and not of industry.

The holder of radioactive wastes¹⁸⁵ who intends to ship them within the Community must submit an application to the country of origin of the wastes. The country of origin must send the application for approval to the country of destination and the countries of transit.¹⁸⁶ The country of destination may take as long as three months to approve, refuse, or set conditions for the shipment.¹⁸⁷ Three months is a very long period of time because of today's rapid means of communication. However, if no response is received within two months, the consent of transit and destination countries is implied "unless they have informed the Commission that they do not accept this automatic approval procedure."¹⁸⁸ Consent is not implied, as we have seen, for hazardous and red list waste transfers.

To lessen the burden of the application procedure, a general authorization can be granted for multiple shipments if the radioactive waste has essentially the same physical, chemical and radioactive characteristics, and the holder,

¹⁸² *Id.*, Art. 41.

¹⁸³ *Id.*, Art. 42.

¹⁸⁴ Council Directive 92/3 of 3 February 1992 on the supervision and control of shipments of radioactive waste between Member States and into and out of the Community, OJ L 35/24 (1992) [hereinafter 1992 Directive].

¹⁸⁵ "Holder of radioactive wastes" is defined as "any natural or legal person who, before carrying out a shipment, has the legal responsibility for such materials and intends to carry out shipment to a consignee." *See id.*, Art. 2.

¹⁸⁶ *Id.*, Art. 4.

¹⁸⁷ *Id.*, Art. 6(1) & (3).

¹⁸⁸ *Id.*, Art. 6(4).

disposer and states involved are the same.¹⁸⁹ General authorizations, however, cannot last for more than three years.¹⁹⁰

After the approval of the transit and destination states, the state of origin can authorize the shipment.¹⁹¹ The approvals and the holder's application must accompany each shipment.¹⁹² After receiving the wastes, the consignee¹⁹³ must send an acknowledgment to the state of destination,¹⁹⁴ which must, in turn, send copies of the acknowledgment to the other countries involved in the operation.¹⁹⁵

For waste imports into the Community, the Member State of the consignee is considered the country of origin. Hence, the consignee is the one who must submit an application to the Member State where her facility is located.¹⁹⁶ For wastes transferred through the Community, the Member State through which the wastes enter the Community is regarded as the country of origin.¹⁹⁷

Waste exports to Antarctica and sixty-eight ACP state parties to the Lomé Convention are prohibited.¹⁹⁸ Waste exports are also prohibited if the country of origin determines – using certain criteria to be established at a later date – that the country of destination is deprived of the “technical, legal or administrative resources to manage the radioactive waste safely.”¹⁹⁹ Otherwise, the country of origin,²⁰⁰ provided that the conditions imposed by the country of destination are fulfilled, must authorize the waste shipment and inform accordingly the country of destination.²⁰¹ The holder must notify the country of origin that the wastes have arrived, and indicate the last Community customs office through which they passed.²⁰² The holder's notification must be substantiated by a declaration of the consignee verifying the receipt of the wastes, and the post of entry in the country of destination.²⁰³

Waste shipments that cannot be completed in compliance with the Directive must be taken back.²⁰⁴ Member States must provide the Commission with the names and addresses of their competent authorities,²⁰⁵ and must complete

¹⁸⁹ *Id.*, Art. 5.

¹⁹⁰ *Id.*

¹⁹¹ *Id.*, Art. 7.

¹⁹² *Id.*, Art. 8.

¹⁹³ Consignee of radioactive wastes “means any natural or legal person to whom such material is shipped.” *See id.*, Art. 2.

¹⁹⁴ *Id.*, Art. 9(1).

¹⁹⁵ *Id.*, Art. 9(2).

¹⁹⁶ *Id.*, Art. 10(1).

¹⁹⁷ *Id.*, Art. 10(2).

¹⁹⁸ *Id.*, Art. 11(1).

¹⁹⁹ *Id.*, Art. 11(2).

²⁰⁰ *Id.*, Art. 12(1).

²⁰¹ *Id.*, Art. 12(2).

²⁰² *Id.*, Art. 12(5).

²⁰³ *Id.*, Art. 12(6).

²⁰⁴ *Id.*, Art. 15.

²⁰⁵ *Id.*, Art. 17.

bi-annual reports on the implementation of the Directive.²⁰⁶ The Commission must prepare the "standard document" for authorization, approval, and acknowledgment of receipt.²⁰⁷

The Directive does not apply to small quantities of radioactive wastes with no significant concentrations of radionuclides.²⁰⁸ It identifies as radioactive wastes only materials "for which no use is foreseen."²⁰⁹ This excludes from the definition spent fuel destined for reprocessing.²¹⁰ And this is reasonable since international politics dictate that exports of spent fuel must be regarded as exports of nuclear substances, and must be controlled more stringently.²¹¹

3. THE DRAFT WASTE LIABILITY DIRECTIVE AND THE EUROPEAN INSURANCE MARKET

The Commission has proposed a Directive that prescribes strict and unlimited liability for private actors involved in hazardous waste management.²¹² According to the Commission, strict liability for environmental harm is becoming increasingly prevalent in both international²¹³ and domestic law.²¹⁴ The Directive's purpose, therefore, is to establish a uniform liability system which will ensure that waste producers internalize the costs of waste production.²¹⁵

The proposed Directive differs from CERCLA, the United States legislation, in two respects: it does not explicitly address the problem of abandoned

²⁰⁶ *Id.*, Art. 18.

²⁰⁷ *Id.*, Art. 20.

²⁰⁸ *Id.*, Art. 1(1). These quantities and concentrations are included in articles 4(a) and (b) of the 80/836 Directive of 15 July 1980 amending the Directives laying down the basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation, OJ No L 246/1 (1980).

²⁰⁹ *Id.*, Art. 2.

²¹⁰ The Council did not adopt the suggestion of the Economic and Social Committee to include radioactive wastes destined for reprocessing within the scope of the Directive. *See* Opinion on the draft Council Directive amending 80/836 laying down the basic safety standards for the health protection of the general public and workers against the dangers of ionizing radiation as regards to prior authorization of shipments of radioactive waste, OJ C168/18 (1990).

²¹¹ Chapter 3, Section 1.5.

²¹² Proposal for a Council Directive on Civil Liability for Damage Caused by Waste, COM(89) 282 final, Sept. 15, 1989 (including Explanatory Memorandum) [hereinafter Proposal]. It was further amended by COM(91) 219 final, June 27, 1991 (including Explanatory Memorandum) [hereinafter Amendment].

²¹³ *Id.* at 2 (the Commission refers to the products liability Directive, to the international Conventions on nuclear energy and oil pollution, and the draft Convention on compensation for damage caused by the carriage of dangerous goods by rail, road or inland waterway).

²¹⁴ *Id.* ("The same trend is becoming increasingly established in national legislation. Germany and Belgium have already introduced the principle of no-fault liability. In France, it is well established by case law. Case law in the Netherlands is moving in the same direction, and the law is being drafted to introduce the principle in the new Civil Code. In Spain strict liability has been introduced in the waste management sector.").

²¹⁵ *Id.* at 1.

waste sites, and it covers personal injury cases. Moreover, it explicitly incorporates a cost-benefit analysis for estimating the costs of cleaning-up the environment.

The Directive imposes strict, unlimited,²¹⁶ and joint and several liability²¹⁷ on the “producer of wastes.”²¹⁸ For the purposes of the Directive, producers of wastes are importers of wastes from non-Community countries,²¹⁹ waste disposers,²²⁰ and persons in control of wastes when the producer cannot be identified.²²¹ In the latter case, producers will be held liable for a limited amount, if the damaging incident falls within the scope of the liability Convention concerning the carriage of dangerous goods.²²² The Directive does not clarify whether transfers to licensed disposal facilities will exonerate generators from liability.

Damages under the Directive include harm resulting from death or physical injury, and damage to property.²²³ Plaintiffs can bring an action against polluters under national law which also determines whether lost profits may be recovered and who can bring an action in the event of impairment of the environment.²²⁴ With respect to environmental damage, plaintiffs can claim compensation for the costs of preventing harm to the environment, restoring the environment, and for damage caused by preventive measures. The entitlement to compensation, however, is subject to a cost-benefit analysis: there is no entitlement to compensation when the costs of restoration substantially exceed the benefits, or if substantially cheaper restoration measures are available.²²⁵ Impairment of the environment is defined as significant physical, chemical or biological deterioration of the environment.²²⁶

Despite the claims of the Commission that the purpose of the Directive is to establish a uniform liability system, the precise remedy²²⁷ and the standard

²¹⁶ *Id.*, Art. 8.

²¹⁷ *Id.*, Art. 5.

²¹⁸ *Id.*, Art. 2(1)(a) (producer of wastes is anyone who in the course of commercial or industrial activity produces wastes and anyone who engages in processing, mixing, or other operations resulting in a change of the nature or composition of waste).

²¹⁹ *Id.*, Art. 2(2)(a) (importers are not held liable when wastes exported from the Community are reimported without a substantial change in their nature and composition).

²²⁰ *Id.*, Art. 2(2)(c).

²²¹ *Id.*, Art. 2(2)(b).

²²² *Id.*, Art. 3(1). *See also* Chapter 2, Section 5.2.

²²³ *Id.*, Art. 2(1)(c).

²²⁴ *Id.*, Art. 4(1)(a).

²²⁵ *Id.*, Art. 4(2).

²²⁶ *Id.*, Art. 2(1)(d).

²²⁷ “The national laws of the Member States shall determine ... the remedies available to [plaintiffs] which shall include: (i) an injunction prohibiting the act or correcting the omission that has caused or may cause the damage and/or compensation for the damage suffered; (ii) an injunction prohibiting the act or correcting the omission that has caused or may cause impairment of the environment (iii) an injunction ordering the reinstatement of the environment and/or ordering the execution of preventive measures and the reimbursement of costs lawfully

of proof²²⁸ are left to national legislation. The Directive also provides that non-governmental organizations can bring an action against polluters but only according to Member States' domestic legislation.²²⁹

Polluters are shielded from liability only when they can prove that the damage or injury to the environment was the result of *force majeure*,²³⁰ or of an intentional act or omission of a third party.²³¹ They can reduce or avoid liability when the damage is partly caused by the injured party.²³² Waste disposers are exempt from liability, if they can prove that they were not negligent and that the producer failed to fully inform them about the nature of the waste.²³³

The scope of the Directive includes hazardous and non-hazardous wastes,²³⁴ but not nuclear wastes.²³⁵ The Directive does not distinguish between recyclable and non-recyclable wastes. The Economic and Social Committee has praised the Commission for deciding to regulate recyclable wastes.²³⁶ The Economic and Social Committee has also recommended that carriers should use a distinctive sign indicating whether the wastes they carry are for recycling or final disposal.²³⁷ Finally, the Committee suggested that waste carriers, like waste generators, should be held primarily liable because it will be difficult to identify the waste producer before the expiration of the

incurred in reinstating the environment and in taking preventive measures (including costs of damage caused by preventive measures)." *See id.*, Art. 4(1)(b).

²²⁸ *See id.*, Art. 4(1)(c).

²²⁹ *See* Amendment, *supra* note 212, Art. 4(3).

²³⁰ *Id.*, Art. 6(1)(b).

²³¹ *Id.*, Art. 6(1)(a).

²³² *Id.*, Art. 7(2).

²³³ *Id.*, Art. 7(1).

²³⁴ *Id.*, Art. 2(1)(b).

²³⁵ The justification for not including nuclear wastes under the scope of the Directive is that there exist already international Conventions prescribing liability for activities involving nuclear wastes. Most European countries have signed the Paris Convention. International regulation of other issues, however, has not prevented the Commission from proposing appropriate legislation. In addition, the Paris Convention has many inadequacies that could be addressed by Community legislation. *See* Proposal, *supra* note 212, at 2. The reluctance of the Commission to regulate radioactive wastes stems from the Community's support for nuclear energy. This support is reflected in the Euratom Treaty which is more preoccupied with the facilitation of the development of nuclear industry than with establishing safeguards for the operation of nuclear power plants or for the disposal of radioactive wastes. As a result, the Commission has adopted a position of non-intervention in domestic nuclear energy programs. The lack of genuine supervision and the absence of safeguards for the military uses of nuclear power have left radioactive waste management practicably unregulated, and have deeply corrupted the nuclear industry which has been frequently involved in illegal radioactive waste transfers. *See* Hancher, 1992 and Accountability Gaps: the Transnuklear Scandal: A Case Study in European Regulation, 53 *Modern Law Review* 669 (1990). *See also* generally Chapter 4.

²³⁶ Opinion on the Proposal for a Council Directive on Civil Liability for Damage Caused by Waste, CES(90) 215.

²³⁷ *Id.*

statute of limitations.²³⁸ The Commission has yet to include this recommendation in the amended Directive.

The Directive also provides that waste generators and disposers must obtain insurance²³⁹ and that the Commission must study the feasibility of developing a "European Fund for Compensation for Damage and Impairment of the Environment Caused by Waste."²⁴⁰ The imposition of compulsory insurance has intensified the insurance industry's opposition to the Directive.²⁴¹ The insurance industry fears that the vague language of the Directive could be interpreted to include liability for past misdeeds of policyholders, and compulsory insurance for both accidental and gradual pollution.²⁴² In other words, the insurance industry is apprehensive of a liability scheme believed to be responsible for the litigation and insurance crises in the United States. But the concerns that the United States precedent will be repeated within the Community context are unfounded. This is due to the differences between the legal systems of European Community countries and the United States. The civil procedure rules of many Community countries often compel the losing party to pay the legal costs of the winning party. Most European systems also do not provide for jury trials, broad discovery and noneconomic or punitive damages. Thus, even if the final version of the waste Directive eventually contains language similar to the United States tort doctrine, it does not follow that its implementation will encourage litigation or that it will affect insurance availability.²⁴³ In fact, it has been suggested that, because of the legal traditions of Community countries and a general European distaste for confrontation, litigation will remain only a last resort measure within the European Community.²⁴⁴

An additional indication that the European Community is unlikely to experience an insurance crisis is that in Europe insurance contracts providing for sudden and accidental pollution have been interpreted narrowly.²⁴⁵ It is true that stringent environmental legislation has adversely affected insurance

²³⁸ A plaintiff can bring an action within three years from the date the damage or injury to the environment occurred. See Amendment, *supra* note 212, Art. 9. The right to compensation expires after thirty years. See *id.*, Art. 10.

²³⁹ *Id.*, Art. 11(1).

²⁴⁰ *Id.*, Art. 11(2).

²⁴¹ Souter, E.C. Insurers to Scramble to Avoid Clean Up Liability, *Business Insurance*, Oct. 21, 1991, at 30.

²⁴² *Id.* See also Scotton, European Marketplace Faces Crisis: Insurer, *Business Insurance*, June 10, 1991, at 38.

²⁴³ Schwartz, Product Liability and Medical Malpractice in Comparative Context, in *Liability Maze*, *supra* note 449, at 28, Chapter 5 (the author emphasizes that differences in doctrine cannot explain why significantly more suits are brought in the United States than in Europe, Japan or Canada because these countries have doctrines similar to the United States liability doctrine. He demonstrates that jury trials, liberal rules of discovery, contingency fees, and punitive damages make the United States tort system more unpredictable and costly).

²⁴⁴ Thomas, "New" Europe is Years Away; Cultural Traditions, Not E.C. Directives, Shape Risk Functions, *Business Insurance*, May 27, 1991, at 27 (Lexis, Nexis, Omni File).

²⁴⁵ *Id.*

markets in some Community countries.²⁴⁶ However, this does not seem to be neither irremediable²⁴⁷ nor irreversible. In many European countries strict liability and environmental regulations have intensified the trend toward alternative insurance through captives or mutuals.²⁴⁸

²⁴⁶ For example, British insurers have been reluctant to provide pollution coverage. *See* Green Insurance: Missing Market, *Economist*, Sept. 19, 1992, at 94.

²⁴⁷ In England, for example, insurance is readily available from Swiss and American insurers who claim to make significant profits from environmental premiums. *See id.*

²⁴⁸ *See, e.g.,* Zeller, European Solutions to EIL Coverage; Environmental Impairment Liability Insurance, *Best's Review – Casualty Insurance Edition*, Mar. 1991, at 14 (Lexis, Nexis, Omni File); Aldred, Pollution Crackdown in Europe; EIL Insurance Increasingly Scarce, *Business Insurance*, Oct. 8, 1990, at 35 (Lexis, Nexis, Omni File) (mentioning a French insurance pool providing insurance for both accidental and gradual pollution damage; German general insurance liability policies providing coverage for bodily injury resulting from both sudden, accidental and gradual pollution; and a Swedish insurance consortium that has created a fund to indemnify third parties for pollution caused by insolvent or unknown polluters).

CHAPTER 7

Alabama V. Belgium: The Community and United States Perspectives through the Microscope of Transnational Waste Management

This Chapter evaluates the Community and the United States legislation vis-à-vis the proposed international system of minimum standards and transnational waste management. It reveals also that the Supreme Court and the Court of Justice rationales on waste transfers coincide despite the seeming divergence of outcomes.

1. UNITED STATES REGULATION: LACK OF AN INTERNATIONAL PERSPECTIVE

RCRA is not explicit about the desired goals of the United States hazardous waste management policy. On the contrary, it is based on a series of antinomies. It sets as goals waste minimization and recycling, and aspires to attain them by outlawing land disposal. The land disposal prohibitions, though, are compromised. The “no migration” standard, because it is unattainable, is diluted by EPA’s technology and concentration standards that subsequently concede to numerous variances.

According to the thesis of this study, RCRA’s goals are too ambitious. Waste minimization and recycling, while they are desirable goals from a management perspective, must not be the principal goals of a national policy. In particular, efforts to minimize waste production by prohibiting land disposal are prone to create worse externalities by spurring illegal disposal and waste mismanagement. Detailed and complex concentration and technology standards for land disposal have inevitably created confusion in the regulated community. Since compliance with these standards is unrealistic, RCRA eventually allows landfill disposal if certain minimum technological requirements are followed. Establishing minimum standards is, according to this study, the soundest policy prescribed under RCRA because it accounts

for the *static* dimension of wastes. It is unfortunate, however, that RCRA minimum standards are formulated as exceptions, and that they are open to other exceptions.

RCRA belongs to the category of political-pragmatic legislation. Its implicit goal is to regulate land disposal. But this is never expressly stated. On the contrary, it is couched in a prohibitory language that depicts the norm as an exception. The minimum standards approach proposed here, on the other hand, establishes clear and specific threshold standards. These standards are not exceptions or subject to other exceptions. The unequivocal formulation of minimum standards is more likely to attract industry's compliance. It could be argued, however, that since the United States minimum standards have been unable to deter illegal waste exports, the same would hold true for the proposed minimum standards. In fact, it could be argued that the United States minimum standards are even more lenient, since they are subject to exceptions; and, therefore, they should have enticed industry's compliance.

This argument can be easily countered if one examines the whole hazardous waste regime in the United States. RCRA is accompanied by a strict, unlimited and retroactive liability statute in which defenses are practically unavailable.¹ Such a liability regime renders minimum standards inconsequential from a business viewpoint. On the contrary, the minimum standards approach proposed here is supplemented by strict and unlimited liability only if the minimum standards are violated. Therefore, it creates an atmosphere of certainty which can encourage industry to engage in legal behavior.

On the other hand, even the minimum standards proposed in this study could not deter no-standards waste transfers, if only the United States implements them. As is usually the case with international standards, minimum standards will be successful only, if all the countries concerned endorse them. If the United States adopts the minimum standards approach, but the rest of the world still engages in no-standards waste management, it would not be surprising to see most of the United States wastes transferred to other countries. The minimum standards approach attempts, by proposing not unduly onerous standards, to entice the allegiance of developing countries which are frequent waste recipients and unwilling to implement stringent environmental legislation. I have also stressed that even the other management standards should not disregard the capacity of developing countries to implement sophisticated technology.

Another shortcoming of the United States policy is the total lack of coordination. While EPA supervises hazardous waste management, it does not coordinate it. Such coordination would involve comprehensive information on waste production, facilities, services and average prices, and, if needed, plans for additional waste management infrastructure. The concept of integrated regional facilities open also to industries located outside the United

¹ See Chapter 5, Section 6.1.

States is not explicitly incorporated in the legislation. However, it is not discounted either since waste imports and interstate transfers are still allowed. In fact, the Supreme Court decisions, which treat wastes as commodities, stimulate transnational waste management considerations in the United States.

The United States experience is instructive for the prescription of effective international policies. It demonstrates, for instance, that intensification of bureaucracy is not the optimal method for detecting illegal waste trafficking and fostering sound waste management. The manifest system, which is a domestic version of the prior notification and informed consent requirement, has been ineffective in detecting illegal waste traffickers. More important, as we have seen, have been tips from previous employees, business competitors and concerned citizens. Cumbersome permitting requirements for waste management facilities have delayed the construction of more modern facilities, and have perpetuated the operation of old and ineffective ones. The small-quantity-generator exceptions provide also a clear illustration of the limits of excessive regulation, and underline the need to invent new techniques to attract compliance.

The complexity and inflated bureaucracy of the United States legislation virtually guarantee that domestic and international illegal waste trafficking will persist. This is especially so if less stringent legislation or enforcement procedures are prevalent in the less developed countries of the south.

The NWPA's primary objective is the search for a permanent waste repository. The NWPA is designed to respond to perceptions that an underground repository would resolve the issue of permanent radioactive waste disposal. The act has started as an operative-pragmatic statute, but on the way has been politicized because of the strong opposition to radioactive waste repositories. The act is also deprived of the transnational perspectives otherwise prevalent in radioactive waste management. Such perspectives are evidenced, for example, by the agreement between the United States and Russia to use Soviet nuclear weapons as fuel for the United States nuclear power plants. Such transnational considerations could potentially be viewed as inappropriate for national legislation. Yet failure to recognize the international dimensions of an issue frequently leads to short-sighted policies. The act, for instance, could be amended to include provisions regarding the repercussions of such an agreement on waste management which is inter-related with the future of nuclear power. Another example of the disregard for transnational concerns is that the development of a Pan-American repository is not even contemplated. Such repository could be located in the United States, and could accept spent fuel – which otherwise could be diverted to the production of nuclear weapons – from less developed American or other countries.

The LLRWA is the only statute prescribing a regional system for waste disposal. But it has been criticized for spurring the creation of too many compacts and too many facilities for a shrinking volume of radioactive wastes. When Congress enacted the statute, it did not expect that parochial considerations would prevail and induce compact multiplication. Therefore, it

delegated low-level radioactive waste management to states without designating a maximum number of facilities. The delegation, however, has proven inefficient and ineffective. Today, the detrimental effects of parochialism are evidenced by the unwillingness of states to become host states unless their compact partners undertake the same responsibility at a future date. Such a demand will proliferate the number of sites and expenses, and jeopardize present and future monitoring and enforcement.

A national low-level radioactive waste plan inclusive of cost-effectiveness concerns of improving and expanding the existing waste management infrastructure would be less wasteful. Furthermore, a smaller number of compacts could reduce the costs of appeasing public opposition. The drafters of LLR-WA did not additionally explore the possibilities presented by transnational waste management – for example, the possibility of participating in nuclear waste trade or swaps with other countries within or outside the American region. The lack of strategic planning and of a transnational perspective has limited the horizons of low-level radioactive waste management in the United States.

2. COMMUNITY REGULATION: LACK OF A COMMUNITY PERSPECTIVE

The European Community was born as an economic Community with the goal of eliminating internal barriers to the free movement of goods, services and capital. Economic integration, it is hoped, will foster the development of economies of scale, enhance competitiveness and appease the divisive nationalism that fueled two world wars. For the federalists² and functionalists³ economic integration is bound to lead, due to the spillover effect,⁴ to closer political and social integration and finally to unification.⁵

From the perspective of a 1990s observator, European integration has proceeded rapidly since the Treaty of Rome. Setbacks and crises⁶ have not been infrequent, but integration seems to progress in spite of – or because of – them. The Single European Act has been followed by the Treaty on European Union⁷ which has been ratified, with opt-out clauses, by the most reluctant European partners – Denmark and Britain. Economic recession, persistent

² See W. Hallstein, *Europe in the Making* (1972).

³ For the distinction between federalists and functionalists, see D.P. Calleo, *Europe's Future: The Grand Alternatives* 23–67 (1965).

⁴ See E.B. Haas, *Beyond the Nation-State* 111 (1964); Haas, *Technology, Pluralism and the New Europe*, in *A New Europe?* 62, 74, 77 (Graubard ed. 1964); E.B. Haas, *The Uniting of Europe* 12, n. 7 (1958).

⁵ The critics of functionalists stress that intergovernmental negotiations and the idealism of heads of states are the decisive factors in European integration. See P. Taylor, *The Limits of European Integration* (1983). See also Keohane and Hoffmann, *Community Politics and Institutional Change*, in *The Dynamics of European Integration* 276, 287 (Wallace ed. 1990).

⁶ For example, the 1966 Luxembourg Accord, see A. Pratte, *Quelle Europe?* 124 (1991).

⁷ According to the Treaty on European Union, commonly known as Maastricht Treaty, foreign policy, defense, justice and security are transferred to the Community, but are subject to

unemployment,⁸ monetary difficulties, and the Yugoslavian crisis, may have toughened the road to final unification.⁹ Quandaries, however, must not divert attention from accomplishments – the development of a stable and relatively affluent polity, guarantor of democratic institutions, and attractive to join.¹⁰

Environmental policy entered formally the Community agenda in 1987 with the ratification of the Single European Act.¹¹ Community environmental policy, according to the Single European Act, must strive for a high level of protection.¹² As mentioned above, decisions on environmental policy are reached unanimously¹³ and Member States can adopt more stringent environmental measures “compatible” with the Treaty.¹⁴ The Single European Act introduces also the principle of subsidiarity, which mandates that the Community must act in the area of the environment only to the extent that environmental objectives¹⁵ “can be attained better at the Community level than at the level of the individual Member States.”¹⁶ The Single European Act stresses the importance of preventive action by providing that environmental damage should primarily be rectified at the source.¹⁷ It was this latter

Member State cooperation (*see* Art. J *et seq.*). The Maastricht Treaty also contains provisions on Member State cooperation in the fields of justice and home affairs (Art. K *et seq.*). It introduces the notion of European citizenship (Arts. 8c–8d). It introduces the codecision procedure that allows more participation of the Parliament in the decisionmaking process (Art. 189b). Finally, it proceeds aggressively with economic and monetary union (*see* Title VI). Nevertheless, the Treaty of Maastricht has been criticized for doing little to rectify the democratic deficit, and for neglecting concerns about the inclusion in the Community of eastern European countries. *See* Treaty on European Union, Dec. 9–10, 1991, reprinted in 31 I.L.M. 227 (1992). *See also* A. Raoux and A. Terrenoire, *L'Europe et Maastricht* 162–77, 246–55 (1992) [hereinafter *L'Europe*].

⁸ The Jobless Besiege Castle Europe, *Economist*, June 26, 1993, at 73.

⁹ *See* A Survey of the European Community, *Economist*, July 3, 1993.

¹⁰ *See* Zouev, *The European Community: Nucleus of European Integration*, in *In From the Cold* 259, at 264 (Baranovsky and Spanger eds. 1992).

¹¹ Single European Act, Feb. 17 & 28, 1986, reprinted in 25 I.L.M. 506 (1986). However, the Community was able to regulate environmental issues long before the adoption of the Single European Act by taking advantage of articles 100 and 235 of the Treaty. Under article 235, “[i]f action by the Community should prove necessary to attain, in the course of the operation of the common market, one of the objectives of the Community and this Treaty has not provided the necessary powers, the Council shall, acting unanimously on a proposal from the Commission and after consulting the European Parliament, take the appropriate measures.” For the role that articles 100 and 235 have played in broadening the Community’s competence, *see* Usher, *The Gradual Widening of European Community Policy on the Basis of Article 100 and 235 of the EEC Treaty*, in *Structure and Dimensions of the European Community Policy* 30 (1988).

¹² Single European Act, *supra* note 11, Art. 100A(3).

¹³ *Id.*, Art. 130S.

¹⁴ *Id.*, Art. 130T.

¹⁵ *See id.*, Art. 130R(1) (the objectives are: “(i) to preserve, protect, and improve the quality of the environment; (ii) to contribute towards protecting human health; (iii) to ensure a prudent and rational utilization of natural resources.”).

¹⁶ *Id.*, Art. 130R(4).

¹⁷ *Id.*, Art. 130R(2).

provision that the Court of Justice interpreted to advance the principles of proximity and self-sufficiency in waste management.

The Maastricht Treaty has explicitly established the precautionary principle. It underlines the international dimension of environmental issues,¹⁸ and clarifies that harmonization measures concerning the environment must include "a safeguard clause allowing Member States to take provisional measures, for non-economic environmental reasons, subject to a Community inspection procedure."¹⁹ The Treaty of Maastricht also changes the voting procedure. Most environmental issues are to be decided by the cooperation procedure.²⁰ General action programs setting priority objectives are to be promulgated by the new codecision procedure,²¹ and only fiscal nature, land use planning – with the exception of waste management – and energy measures have to be adopted by unanimity.²² In the Treaty of Maastricht, the subsidiarity principle is reformulated in a more flexible manner as a general principle of the Community policy.²³

Both the Single European Act and the Treaty on European Union, therefore, establish Community competence in the area of the environment. The Community has made extensive use of this competence in the field of waste management by enacting comprehensive waste legislation and radioactive waste management programs. Regarding waste transfers, however, the Community has made paradoxical use of its competence: instead of eliminating interstate barriers to waste trade, it has raised such barriers. For waste movements within the Community, the 1984/86 Directive and 1993 Regulation that replaced it have incorporated a basically international rule – the requirement of prior notification and informed consent – which also applies to waste movements between the Community and third countries. This requirement is

¹⁸ Under article 130R(1) of Maastricht Treaty, *supra* note 7, the Community must promote measures at the international level to deal with regional or worldwide environmental problems.

¹⁹ *Id.*, Art. 130R(2).

²⁰ *See id.*, Art. 130S(1). The cooperation procedure was first established by the Single European Act. *See* Art. 149 of the Single European Act. In the Maastricht treaty the cooperation procedure is included in article 189C. For a description of the cooperation procedure, *see* Bermann, *The Single European Act: A New Constitution for the Community?*, 27 *Columbia Journal of Transnational Law* 529, at 577–80 (1989).

²¹ *See* Maastricht Treaty, *supra* note 7, Art. 130S(3). For a description of the codecision procedure, *see* L'Europe, *supra* note 7, at 154–58.

²² *See* Maastricht Treaty, *supra* note 7, Art. 130S(2).

²³ *See id.*, Art. 3B. ("The Community shall act within the limits of powers conferred upon it by this Treaty and of the objectives assigned to it therein. In areas which do not fall within its exclusive competence, the Community shall take action, in accordance with the principle of subsidiarity, only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale of effects of the proposed action, be better achieved by the Community. Any action of the Community shall not go beyond what is necessary to achieve the objectives of this Treaty [emphasis added]."). The qualifications "sufficient" and "necessary" in combination with the expansion of the Community competence render this provision very indeterminate. For a critique of the provision, *see* L'Europe, *supra* note 7, at 188–91.

not applicable to waste movements within a Member State, thus rendering national borders a decisive element in the regulation of waste movements.²⁴

Raising national barriers to waste movements is the exact opposite of the Community's purpose, which is, as emphasized, elimination of such barriers. It will also lead, as most environmental policies based on national borders, to absurd situations. For example, a waste generator transferring wastes to a remote and ineffective domestic facility will not need the consent of transit and receiving localities. But transferring wastes to a proximate and effective foreign facility will be impossible without the consent of the affected countries.

Another anomaly of the Community legislation are the proximity and self-sufficiency principles. This is because these principles are often mutually exclusive: for certain waste generators proximate facilities are not their national facilities. Therefore, proximity will have to be sacrificed for self-sufficiency or vice-versa. Even when both principles favor a domestic over a foreign facility, such preference is hardly defensible from a Community standpoint. As mentioned above, the Community idea is based on the conviction that a common or joint approach to shared problems will be more effective than an individualistic, nationalist approach. The problem of waste management is also a common problem for which the Community has explicit authority to prescribe policies, and the same rationale should, therefore, have prevailed for its solution. However, a narrow interpretation of the Community legislation could lead to conclusions that this rationale has not predominated. The Community, instead, seems to have considered desirable to establish self-sufficiency in waste management not only at the Community level, but also at the Member State level. In other words, if the notion of self-sufficiency is construed restrictively and without regard to the qualifications contained in the text of the legislation, it will clash with the spirit of European integration. One would, thus, assume that serious environmental or economic considerations compelled such a deviation.

If the reasons are economic, they are easily refutable. It is not economically sensible to deprive Member States' enterprises of potentially cheaper and more effective facilities beyond the national borders just to achieve self-sufficiency or waste disposal closer to the point of generation. European Community countries – especially those which produce large amounts of hazardous wastes – already have a strong waste management industry. As was emphasized before, this industry views wastes in a *dynamic* fashion, as products that will bolster its profitability, and this perspective is instrumental in fostering sound waste management. The principles of proximity and self-sufficiency, instead of enhancing the expansion, growth and integration of the European waste management industry, will subsidize small landfill owners closer to production centers. Small landfill owners do not take advantage of

²⁴ See also Regulation, *supra* note 108, Chapter 6, Art. 13 (1). But see Proposal for a Council Regulation on the Supervision and Control of Shipments of Waste Within, In and Out of the European Community, at 5, COM(90) 415 final.

the economies of scale, therefore, they are less technologically equipped to provide cheap and effective services.

From an environmental viewpoint, it is not only the better and cheaper services of a bigger and integrated management sector that are forfeited by the application of proximity and self-sufficiency. It is also better monitoring and enforcement. As graphically demonstrated by *Huiles Usagées*²⁵ smaller facilities are difficult to monitor and difficulties in monitoring jeopardize enforcement. Moreover, proximity does not necessarily advance sound waste transfers since, for such transfers, distance is not the factor that determines the frequency and severity of accidents.²⁶

Self-sufficiency at the Community level is not justified for similar reasons. Self-sufficiency will deprive the Community of other countries' more efficient and effective facilities simply because their location is beyond the Community area. Isolationism will also hamper international cooperation and the development of transnational facilities offering better and less expensive services. Isolationism will make also impossible international monitoring because it will increase the number of facilities that need to be monitored.

The underlying premise of the argument favoring proximity and self-sufficiency is that such principles promote waste reduction and reuse, and therefore, aggressively advance sound waste management. If states, communities and localities are convinced that they cannot rely on the assistance of others to manage their wastes, they will reduce them.

On its face, this argument seems reasonable, but a deeper analysis reveals many shortcomings. As emphasized, the realities of waste management embedded in the *static* dimension of wastes demonstrate that the self-sufficiency and proximity principles do not necessarily lead to waste reduction. Self-sufficiency and proximity may prevent waste producing countries or localities from externalizing the costs of waste production by transferring wastes to other countries. Nonetheless, they are bound to inflict gross externalities, if countries instead of minimizing their wastes, start engaging in illegal waste trafficking. In other words, self-sufficiency is not the *sine qua non* of waste minimization; rather it may induce illegal waste disposal. Even if waste minimization legislation is enacted, it will not be successful as long as illegal trafficking continues unabated. But as emphasized, states are unwilling to devote resources to meaningfully reduce illegal trafficking because such reduction could be very costly. When costs are high and resources scarce states prioritize their goals. They make decisions, for example, on whether abatement of illegal waste trafficking deserves more resources than elimination of illicit trade in radioactive materials or illegal drug trade. A European Community facing a long-lasting economic recession and severe turbulences in the East has to instate similar priorities.²⁷

²⁵ See *supra* note 85, Chapter 6.

²⁶ See Chapter 1, Section 5.2.

²⁷ Its Member States facing economic hardships increasingly do so. See Turning Brown, *Economist*, July 3, 1993, at 55.

Since self-sufficiency is not economically and environmentally advisable, and indeed is contrary to the very notion of European integration, its adoption in the 1993 Regulation – reinforced by the possibility of absolute or systematic bans on waste imports – can only be explained by politics. France, a target of German illegal waste traffickers, refused to allow the adoption of waste transfer legislation unless it entailed the possibility of import bans. Under pressure from an outraged partner, it was hard for the other European countries, and especially Germany, to disavow the inclusion of prohibitions and restrictions in the Regulation.

It is interesting to note, however, that the Community legislation on radioactive waste transfers²⁸ does not even mention the principles of proximity and self-sufficiency. This is so because it is obvious that environmental isolationism, and the consequent multiplication of nuclear disposal facilities are incompatible with sound radioactive waste management. Yet hazardous wastes should not be viewed differently. As emphasized earlier, they can pose as many hazards as radioactive wastes.

This study has proposed that self-sufficiency and proximity must be replaced by transnational waste management. Transnational waste management could be translated, at the Community level, into trans-European waste management. Trans-European waste management entails the development of regional facilities coordinated or planned at the Community level. It also dictates Community participation in international efforts to implement transnational waste management. The purpose of Community planning and coordination, as envisioned here, is to strengthen waste management markets. Private entities are not able to estimate future waste production or coordinate the development of additional waste management infrastructure because they do not have the legitimacy and appropriate resources. The solution lies inevitably within an organ of the Community, preferably, a democratically emancipated Commission or an empowered Environment Agency.

The current legislation contains elements of trans-European waste management: it forces Member States to submit to the Commission their waste management plans and their facilities' identity. But these provisions are not sufficient. After receiving the information about national disposal plans, the Commission must have the authority to study and coordinate them. It must also be further empowered to require the necessary modifications. The Commission must act as a coordinator with overall oversight of the prevalent circumstances and future waste management needs. This is especially so because the goals of sound waste management are conflicting. Making waste management facilities profitable may undermine plans for waste reduction which is the ultimate goal of waste management. The successful interplay, therefore, between the private and public sectors will be pivotal in trans-European waste management.

²⁸ See Chapter 6, Section 2.3.

In the final analysis, the notion of self-sufficiency, as developed in the Community legislation, is not absolute. Under the 1993 Regulation, waste imports and exports are still allowed, especially, for recyclable materials. There are also other exceptions mandating that "the geographical circumstances" and the need for specialized facilities must be considered. The 1991 Framework Directive also provides that Member states must develop an *integrated* network of disposal facilities. The Commission, therefore, may take advantage of the possibilities that these exceptions offer for a more pro-Community interpretation of the Regulation, and the initiation of trans-European waste management.²⁹ The Community already has plans for the development of trans-European networks in the areas of transport, telecommunications and energy infrastructure.³⁰ Waste management must not be an exception.

3. FREE TRADE AND THE ENVIRONMENT

A cursory analysis of the decisions of the Court of Justice and the Supreme Court would characterize them as diametrically opposite. The Supreme Court has rejected prohibitory and restrictive regulations of interstate waste transfers as inconsistent with the commerce clause of the Constitution.³¹ The Court of Justice has upheld prohibitions and restrictions because of the *sui generis* nature of waste and its effects on the environment.³²

An attempt to comprehend the divergent judicial conclusions could start with their constitutional references. Environmental protection is explicitly mentioned in the European constitutional treaties, as a subject-matter of Community policy, but not in the United States constitution. Therefore, an argument could be advanced that the Court of Justice feels more compelled to balance environmental and free trade considerations than the Supreme Court. Such an interpretation could be plausible, but it should be rejected as too textual: the United States constitution has been interpreted to provide Congress with powers far in excess of those explicitly enumerated in it.³³

In interpreting the commerce clause, the Supreme Court has held that if Congress has not exercised its authority to regulate commerce, state or local trade regulations enacted instead will survive judicial scrutiny only if they are not facially discriminatory against other states' products and processes, or if they do not impose excessive burdens on interstate trade compared with the local benefits achieved.³⁴ A similar test is applied by the Court of Justice. Trade restrictions may be struck down either because they raise

²⁹ See, e.g., Opinion 10, *supra* note 94, Chapter 6.

³⁰ See, e.g., COM(92) 231 final, and COM(92) 230 final.

³¹ See Chapter 5, Section 3.

³² Chapter 6, Section 2.1.

³³ See Jacobs and Karst, The "Federal" Legal Order: The U.S.A. and Europe Compared: A Juridical Perspective, in 1 *Integration Through Law* 169, at 173 (Cappelletti, Seccombe and Weiller eds. 1986).

³⁴ See Pike, *supra* note 250, Chapter 5.

quantitative barriers³⁵ or because they are unjustifiable for the pursuit of legitimate national goals.³⁶

In the area of waste management, the United States Congress has not regulated interstate waste trade and the Supreme Court could conclude – as it did – that state waste trade regulations are facially discriminatory against out-of-state wastes. The European Council, on the other hand, has regulated hazardous waste trade with the prior notification and informed consent procedure; thus, the Court of Justice justifiably, in the Wallonia case,³⁷ upheld Community legislation over the Member State's legislation. Therefore, despite their apparent divergence, and from a federal perspective,³⁸ the two Courts' decisions coincide. The Court of Justice continued its self-defined mandate to foster European integration.³⁹ In this spirit, in the Wallonia case it upheld Community hazardous waste legislation over a national regulation that violated it.

The part of the decision relating to solid waste transfers is similarly explainable. The Court, by relying on the environmental rather than the free trade provisions of the Treaty, sought to strengthen the Community's competence in matters other than free trade. In a perfect union, decisions do not have to always revolve around free trade considerations. There are other issues, such as environmental protection, that demand equal consideration. This is particularly so when the case before the Court contains no reference to specific industries affected by the environmental legislation. The effects of legislation on free trade, therefore, cannot be easily detected. The Wallonia case was devoid of express references to specific industries harmed by the Belgian import ban, except for the Commission's vague claim that the Belgian legislation raised quantitative barriers to waste trade.⁴⁰ The Danish

³⁵ See Treaty, *supra* note 93, Chapter 6, Art. 30.

³⁶ See *id.*, Art. 36. See also Case 120/78, *Rewe-Zentrale AG v. Bundesmonopolverwaltung für Branntwein* (Cassis de Dijon), 1 E.C.R. 651 (1979). See also Case 302/86, *Commission of the European Communities v. Kingdom of Belgium*, 8 E.C.R. 4607 (1988) (Danish Bottle); *Huiles Usagées*, *supra* note 85, Chapter 6. *Inter-Huiles*, *supra* note 81, Chapter 6. For a brief summary of the test that the Court of Justice applies, see Heller and Pelkmans, *The Federal Economy: Law and Economic Integration and the Positive State*, in *Integration Through Law*, *supra* note 33, at 245, 359.

³⁷ See *supra* note 92, Chapter 6.

³⁸ There are certainly many federal perspectives. See generally *Integration Through Law*, *supra* note 33. In the Community where the center is weak and Member States are strong, the Court of Justice has strived to strengthen the center.

³⁹ For the unifying role that the Court has played in the process of European integration, see Weiler, *The Transformation of Europe*, 100 *Yale Law Journal* 2403 (1991). See also Mancini, *The Making of a Constitution for Europe*, 26 *Common Market Law Review* 595 (1989). For a critique of the Court's jurisprudence, see H. Rasmussen, *On Law and Policy in the European Court of Justice* (1986). But see also Weiler, *The Court of Justice on Trial* (Review Essay), 24 *Common Market Law Review* 555 (1987) (reviewing H. Rasmussen *supra*).

⁴⁰ In the Wallonia case the Commission acted after receiving a complaint. Neither the Court opinion nor the oral proceedings identify which specific industry or industries were harmed by the Belgian ban. See *supra* note 37.

bottle⁴¹ and *Huiles Usagées*⁴² cases, on the other hand, were explicit about the specific business interests hampered by environmental legislation. In those cases, the Court was notably reluctant to unqualifiedly bow to environmental considerations incompatible with free trade. This inclination of the Court to investigate the particular industrial interests jeopardized by environmental legislation is corroborated by the titanium dioxide and Framework Directive decisions.⁴³ In the titanium dioxide case the Court held that, since the purpose of Community environmental legislation was to harmonize national laws affecting a specific industrial sector, article 100A was the proper legal basis for the titanium dioxide Directive. In the Framework Directive decision, on the other hand, the Court asserted that general environmental legislation that does not affect a readily identifiable industry need not be based on free trade provisions. By differentiating between general environmental legislation and industry-specific harmonization legislation, the Court attempted to invent methods that would strengthen an independent-from-free-trade Community authority in the area of environmental protection. Judicial support of the proximity and self-sufficiency principles in the Wallonia case, when specific industries were not forthrightly hampered, was derived from similar pro-integration considerations.

The reference to the Basel Convention in the Wallonia decision is similarly explainable. Granting legal bearing to the Convention, which at that time was signed but not yet ratified by the Community, was a sagacious judicial technique to affirm Community's treaty-making competence in areas other than the common commercial policy⁴⁴ or association agreements.⁴⁵ International treaties are negotiated and signed by the Commission and ratified by the Council.⁴⁶ By according importance to the signature of the Convention by the Commission, which does not have to lead to ratification by the Council, the Court enhanced the Community's treaty-making authority, and especially treaty-making authority regarding environmental protection.

Appraised in this light, the purpose of the Court of Justice decisions was to enhance the Community's legislative and treaty-making competence, and

⁴¹ The Danish bottle case dealt with Denmark's recycling system for beer and soft drink containers. The Court held that a compulsory deposit-and-return system for the re-use of containers was not disproportionate to the aim of environmental protection. However, it struck down a requirement that only containers approved by the Danish environmental agency could be used as disproportionate to the goal of environmental protection. The Commission brought Denmark before the Court after receiving protests from producers of beverages and containers in other Member States and European associations representing the retail trade, and this is mentioned in the Court decision. See *Danish Bottle Case*, *supra* note 36.

⁴² See *supra* note 36.

⁴³ See *supra* notes 100 and 104, Chapter 6.

⁴⁴ See Treaty, *supra* note 35, Art. 113.

⁴⁵ See Treaty, *supra* note 35, Art. 238. The Court has already expanded the treaty-making authority of the Community. See T. C. Hartley, *The Foundations of European Community Law* 145-65 (1981).

⁴⁶ See Bot, *Negotiating Community Agreements: Procedure and Practice*, 7 *Common Market Law Review* 286 (1970).

thus to strengthen, not to fragment European integration. The same purpose is prevalent in the Supreme Court decisions which emphasize the notion of nationhood and interdependence among the states of the American federation. Since the United States, however, is a more mature union than the Community, the Court of Justice and the Supreme Court are not guided by the same considerations. In the Community, where most environmental legislation has been based on an article regarding free trade, the Court of Justice felt compelled to clarify that, when a specific industry is not harmed, abstract free trade considerations should concede to specific Community environmental legislation or the spirit of Community environmental policy. The Treaty of Maastricht will intensify this trend. The Maastricht Treaty incorporates the cooperation and codecision procedures that facilitate the participation of the Parliament in the decisionmaking process. The Court of Justice, therefore, will be less willing to allow general environmental legislation to be based on article 100A just because that article is more respectful of the democratic process.

One could argue, however, that the pro-integration interpretation of the Court decisions adopted here does not justify the Court's reading of Community policy as inclusive of the principles of proximity and self-sufficiency. The Court could have invoked the concerns about efficiency and effectiveness included in the Basel Convention, and could have construed more expansively article 130R of the Treaty.

This is certainly true. It must not be forgotten, though, that the *Walloonia* case was decided when the 1991 Framework Directive – which contains the principles of proximity and self-sufficiency and is apparently influenced by the Basel Convention – had already been adopted, and the only issue pending was its legal foundation. Since the proximity and self-sufficiency principles are explicitly mentioned in the Directive, it is not surprising that the Court invoked them as guidelines to the Community policy. Invocation of the principles, however, in a case where no specific industry was apparently affected by the restriction of free trade, has not committed the Court to an unqualified implementation of the principles in future cases. When issues affecting specific industry interests reach the Court through preliminary references, the Court must be able to read expansively the self-sufficiency and proximity principles to include trans-European and transnational waste management considerations. Such issues will arise when domestic prohibitions or restrictions prevent a specific industry from exporting or importing wastes. In deciding these cases the Court should revisit its decisions in *Inter-Huiles*⁴⁷ and *Huiles Usagées*.⁴⁸ As emphasized, the formulation of self-sufficiency and proximity principles is not sufficiently rigid to exclude other considerations. The 1991 Framework Directive provides that the “nearest” installation must be “appropriate,” and that the *integrated* network of facilities must take into

⁴⁷ See *supra* note 36.

⁴⁸ *Id.*

account the “best available technologies not involving excessive costs,” “geographical circumstances” or “the need for specialized installations for certain types of wastes.”⁴⁹ The 1993 Regulation which bans waste movements refers to these qualified principles.⁵⁰ The Court of Justice must be able to construe these principles, as it has always done, teleologically, and within the spirit of the treaties which the Court has interpreted to be a Europe without frontiers.

⁴⁹ Framework Directive, *supra* note 3, Chapter 6, Art. 5.

⁵⁰ Regulation, *supra* note 108, Chapter 6, Art. 4(3)(a)(i).

CHAPTER 8

Liability and Enforcement

1. ENFORCEMENT

The traditional conception of enforcement – an international police force independent from the states and able to arrest polluting governments and industries – does not exist at the international level. In international fora those who make the law are those who have to abide by it. States usually comply by enacting appropriate legislation and domestic implementation and enforcement procedures. Compliance is verified by treaty reporting mechanisms. But often state reports are not submitted or are incomplete and both developed and developing countries, for different reasons, are poor reporters of their practices.¹ For instance, in 1990, 90 percent of state parties to the 1987 Montreal Protocol² reported to the secretariat, but only 29 out of the

¹ See generally Not Well Monitored, *supra* note 25, Chapter 2. The GAO has examined the monitoring of eight international agreements: the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer; the Protocol to the 1979 Convention on Long-Range Transboundary Pollution Concerning the Control of Emissions of Nitrogen Oxides (NOX Protocol); the Basel Convention (not at that time ratified); the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter as amended in 1978; the Convention on International Trade in Endangered Species of Wild Fauna and Flora; the International Convention for the Regulation of Whaling; and the International Tropical Timber Agreement. The NOX Protocol and the Whaling Convention were the instruments with the highest level of compliance. This is because the state parties to the NOX Protocol are developed countries that have the capacity to report. *See supra*, at 25. Since whaling is allowed only for aboriginal subsistence or scientific purposes, only six countries have to report. The countries have usually complied with the reporting requirement. *See supra*, at 26. The GAO report stated that it is difficult to evaluate the monitoring of the Basel Convention because the Convention does not define environmentally sound management. *See supra*, at 20. For the monitoring of the London Dumping Convention, *see* Chapter 2, Section 1.1.

² Montreal Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987, reprinted in 26 I.L.M. 1541 (1987) (entered into force Jan. 1, 1989) amended in June 29, 1990 by Adjustments and Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer, reprinted in 30 I.L.M. 537 (1991) (entered into force Aug. 10, 1992) [hereinafter Montreal Protocol]. The Montreal Protocol sets specific deadlines for reduction and final elimination of CFCs and other ozone depleting substances.

52 reporting parties submitted complete data.³ Frequently, the secretariats of the conventions that receive the reports are insufficiently funded and do not possess independent fact finding authority.⁴ Such authority would imply a surrender of national sovereignty which states consider unacceptable.

As demonstrated by the Chernobyl disaster, states are also reluctant to take counter-measures or raise formal claims against other states, for fear of creating precedents haunting them in the future. All states pollute to a greater or lesser extent; therefore, punishment of others could easily backfire. Environmental disputes are mostly negotiated or arbitrated. When negotiating international agreements, states' efforts concentrate on reaching the widest possible consensus. This is especially crucial for environmental agreements which would, otherwise, be ineffective. In general, the nature of international law – which emphasizes negotiation and consensus – is at odds with the municipal concept of enforcement.

Advocates of stronger monitoring and enforcement mechanisms frequently evoke the ozone regime. The ozone regime has evolved rapidly as evidenced by the Vienna Convention,⁵ the Montreal Protocol, and the 1992 Copenhagen Adjustments and Amendments to the Protocol.⁶ The fund established under the Protocol,⁷ despite the legal uncertainties surrounding it,⁸ has been able to financially assist developing countries compliance.⁹ Financial enticements

³ Not Well Monitored, *supra* note 1, at 24–25. This is because some countries do not have financial and technical resources to gather such data, customs offices have difficulties in distinguishing among different substances, and companies treat their data as confidential. *Id.* at 25.

⁴ *Id.* at 28–32.

⁵ See Vienna Convention for the Protection of the Ozone Layer, Mar. 22, 1985, reprinted in 26 I.L.M. 1516 (1987).

⁶ Montreal Protocol, *supra* note 2. Adoption of Adjustments and Amendment by the Fourth Meeting of the Parties at Copenhagen on 23–25 November 1992, reprinted in 32 I.L.M. 874 (1993). The Copenhagen meeting has accelerated the deadlines included in the Montreal Protocol. The adjustments – binding on the signatories without ratification – move the deadline for the elimination of CFCs, carbon tetrachloride, methyl chloroform from the year 2000 to 1996. Reduction of these substances to the 1986 levels has been moved forward to January 1, 1994 (Arts. 2A, 2D, 2E). The amendments include a total phase-out of hydrochlorofluorocarbons (HCFCs) by 2030 and controls on hydrobromofluorocarbons (HBFCs) and methyl bromide (Arts. 2F, 2G, 2H).

⁷ Montreal Protocol, *supra* note 2, Art. 10.

⁸ Whether pledges to the fund are obligatory or voluntary has not yet been resolved. Developed countries claim that the contributions are voluntary. See Whether Accelerated Phase-Out Deadlines Apply to Developing Countries Unresolved, BNA International Environment Daily, Dec. 1, 1992 (Lexis, Nexis, Omni File). A group of developed countries has attempted to incorporate the fund into the Global Environment Facility (GEF) which was established in 1990 to provide grants that will assist developing countries in addressing global warming, loss of biodiversity, water pollution, and ozone depletion. *Id.*

⁹ See Jordan Gets Aid for Environment-Protection Program, Xinhua General Overseas News Service, Feb. 16, 1993 (Lexis, Nexis, Omni File); Venezuela and South Korea Active in Implementing Montreal Protocol, Ozone Depletion Network Online Today, May 19, 1993 (Lexis, Nexis, Omni File); India Ready for Operation Ozone, Xinhua General Overseas News Service, May 12, 1993 (Lexis, Nexis, Omni File); UNDP to Help China Phase Out Ozone-

are accompanied by sanctions. The Montreal Protocol¹⁰ imposes trade sanctions on non-state parties.¹¹ The Copenhagen meeting has also introduced a non-compliance procedure,¹² according to which¹³ state parties having reservations about another party's implementation of the Protocol may submit their concerns to the Secretariat which, in turn, informs the implementation committee.¹⁴ The implementation committee can undertake, upon the invitation of the party concerned, information gathering in the territory of the party.¹⁵ The implementation committee must finally report to the conference of the parties and make recommendations.¹⁶ The report, which does not contain information received in confidence, must be made available to any person upon request.¹⁷ All the other information exchanged by or within the Committee may be made available to any party upon request, but the party must ensure the confidentiality of information received in confidence.¹⁸ The non-compliance procedure includes an "Indicative List of Measures that Might be Taken by a Meeting of the Parties in Respect of Non-Compliance with the Protocol." These measures encompass appropriate assistance, cautions and suspension of specific rights and privileges associated, for example, with industrial rationalization,¹⁹ production, consumption, trade, transfer of technology, financing and institutional arrangements.²⁰

The dispute settlement procedure of the ozone regime is also remarkable. The Vienna Convention²¹ provides that if the parties fail to agree to arbitrate or adjudicate their disputes, a conciliation commission may be established upon the request of one of the parties. The commission will render "a final and recommendatory award, which the parties shall consider in good faith."²²

Depleting Substances, Xinhua General Overseas News Service, April 24, 1993 (Lexis, Nexis, Omni File).

¹⁰ See *supra* note 2.

¹¹ *Id.*, Art. 4.

¹² The non-compliance procedure is an expansion of the procedure that was adopted at the Second Meeting of the Parties. See Report of the Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, June 1990, para. 40, Decision II/5, UNEP/OzL. Pro.2/3, at 11; Annex III, at 40, UNEP/OzL. Pro.2/3.

¹³ Report of the Fourth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Agenda Item 9, Annex IV, at 46, UNEP/OzL.Pro. 4/15 (Nov. 25, 1992).

¹⁴ *Id.* (the implementation committee consists of ten parties elected by the meeting of the parties for two years based on equitable geographical distribution).

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ *Id.*

¹⁸ *Id.*

¹⁹ Industrial rationalization allows a party to transfer some or all of its level of production of controlled substances to another party that has already reached its level of capacity.

²⁰ *Id.*, Annex V.

²¹ See *supra* note 5.

²² *Id.*, Art. 11.

The enforcement procedures prescribed by the ozone regime are to be envied by those who wish to see a similarly enforceable waste transfer regime. It must not be forgotten, however, that the ozone regime is the result of perceptions that have identified ozone depletion as one of the most serious environmental threats. The scientific certainty that CFCs and other substances deplete the ozone has been instrumental in building up the momentum for the adoption of drastic measures.²³

The same scientific certainty does not exist regarding the effects of dangerous wastes on populations and the environment. The lack of incontrovertible scientific evidence prevents governments from acting decisively. Moreover, hazardous wastes encompass millions of substances, and this hampers their regulation. The substances regulated under the ozone regime are limited and specific, facilitating the detection of violations. Another disparity between the ozone and the waste regimes concerns the different nature of the substances regulated. Wastes are substances that will continue to be produced in smaller or larger quantities as long as society remains fixed on industrialization and development. Products deemed dangerous to humans and the environment, however, can be phased out as long as the political will exists.²⁴ In the case of ozone such political will exists in a unique alliance among governments, industries and environmentalists.²⁵ A more important difference between the ozone and the waste regimes has to do with the *static* dimension of wastes. Countries that persist in producing CFCs cannot easily hide that production, especially, if they wish their CFC products to reach the international markets. Their inevitably overt production practices would risk alienating the world community and, consequently, make them more prone to change practices or more sensitive to economic sanctions. Countries, nonetheless, as demonstrated above,²⁶ can pledge allegiance to a restrictive or prohibitory waste regime, but still engage in illegal dumping because of the *static* dimension of wastes. The *static* dimension frustrates enforcement mechanisms. Under the Basel Convention, for instance, a party must prohibit waste movements to and from non-parties. Such prohibition could be considered a trade sanction against countries refusing to comply with the prior notification and informed consent requirement. But it is very doubtful that it will be as effective as

²³ See National Aeronautics & Space Administration, *Antarctic Ozone: Initial Findings From Punta Arenas, Chile* (1988); World Meteorological Organization, *Atmospheric Ozone*, 1985 (Report No. 16, ed. 1985).

²⁴ See Transnational Management, *supra* note 50, Chapter 1, at 15.

²⁵ Japan, U.S. to Help Malaysia with Ozone-Safe Substances, Japan Economic Newswire, Feb. 24, 1993 (Lexis, Nexis, Omni File). ("American electronics giant Motorola Inc., together with Japanese and US government agencies, agreed ... to help Malaysian firms develop safe substitutes for harmful manufacturing solvents that affect the ozone layer The joint project is part of a program promoted by the US-based Industry Cooperative for Ozone Layer Protection (ICOLP) – a consortium of international electronics firms and government bodies devoted to sharing nonproprietary information with developing nations on technologies and processes deemed safe for the ozone layer.").

²⁶ See generally Chapter 4.

trade sanctions on imports and exports of products. Non-parties to the Basel Convention can remain outside the Convention and dispose of the wastes in the high seas or transfer wastes to other non-state parties. They may join the Basel Convention and still engage in illegal transfers because of the lack of a non-compliance procedure. Even if there is such a procedure, countries can still engage in illegal trafficking in the absence of monitoring amounting to an adequately funded twenty-four hour supervision of all international borders and seas.

The *static* dimension of wastes is emphasized in order to demonstrate the limits of traditional methods of enforcement for international waste transfers. Certainly, a non-compliance procedure within the framework of the Basel Convention could enhance compliance of certain image-conscious countries. However, it will be ineffective in the long-run because it will become politically or financially unaffordable. A funding mechanism that would be suspended in cases of non-compliance could deter illegal waste transfers from less developed countries. Such threats, however, will not deter waste shipments from developed countries, which are the major waste producers.

These weaknesses of traditional sticks and carrots illustrate the importance of self-enforcing mechanisms. As underscored before, minimum standards are such a mechanism. So it is an international liability regime which holds responsible not governments, but industry, the principal actor in international waste transfers.

2. PROPOSED LIABILITY REGIME FOR TRANSNATIONAL WASTE MOVEMENTS

2.1. *Liability as a Deterrent of Waste Mismanagement*

Strict liability has been established, nationally and internationally, as the appropriate liability for ultra-hazardous activities, such as hazardous waste generation, transport and disposal. Unlimited liability, on the other hand, has been controversial in both international and national arenas. In international arenas, governments have shied away from unlimited liability in order not to jeopardize insurance availability. In the United States unlimited liability has been the scapegoat for the unavailability of insurance for environmental harms.²⁷ Industries have also been apprehensive of the amalgam of strict and unlimited liability proposed by the Community draft Directive.²⁸

A deeper analysis of the Community and the United States experience, however, reveals that it is not unlimited liability, but a blend of unlimited liability, obscure regulation and expansive judicial interpretation of insurance contracts that have led to insurance unavailability. In order to address these true causes of insurance crises, the proposed here liability regime is viewed as a supplement to minimum standards – standards which are basically technological, clear and specific. It has also been emphasized that other

²⁷ See Chapter 5, Section 6.2.

²⁸ Chapter 6, Section 3.

waste management standards must be clear and specific and inclusive of developing countries' capabilities.

The proposed liability system allows the implementation of these standards to be used as a defense in transnational litigation. Because of their clarity and non-technology forcing nature, the minimum and other standards can prevent expansive judicial interpretation of insurance contracts and increase industry's certainty about expected behavior. In other words, unlimited liability for violations of specific standards will not adversely affect insurance availability. Even if it does, however, governments should not attach disproportionate importance to the protection of traditional insurance industry. There is evidence that the preservation of traditional insurance at all costs is undesirable, and that alternative insurance sources could provide more adequate coverage.²⁹

The relationship between unlimited liability and insurance availability has been carefully examined because the alternative regime proposed here is centered on the idea of unlimited liability. Due to the scarcity of resources, states cannot rely on extensive monitoring and enforcement. The pivotal deterrent mechanism, therefore, is the severity, and not the frequency of penalties. Courts should be able to penalize minimum and other standards violators without restrictions on the amounts of compensation they may prescribe. A reporting system, inclusive of the names of violators and the penalties imposed, and accessible to the public, could also strengthen perceptions that illegal trafficking will not go unpunished.

As demonstrated by the United States experience, strict and unlimited liability, regulations and threats to reputation could be effective in deterring large corporations. One could justifiably question the effectiveness of such devices, however, in deterring small companies penetrated by criminal elements. This is because such companies do not hesitate to violate the law, are not particularly responsive to inducements and sanctions and are indifferent about reputation. As emphasized, however, the proposed system does not aspire to affect the behavior of illegal traffickers. It attempts, instead, to limit their clientele. Minimum and other standards, and liability rules aspire to dissuade enterprises from assigning waste shipments to companies infiltrated by organized crime.

Despite its advantages, strict and unlimited liability is unlikely to prevail. Traces of the ambivalence of the international community to embrace unlimited liability are detected in the CRTD Convention.³⁰ During the negotiations of the Convention many governments defended unlimited liability, contending that it does jeopardize compulsory insurance. Limited liability was adopted, however, but governments have the flexibility to adopt higher liability limits or unlimited liability. The *ad hoc* working group concerned with the drafting of the liability protocol to the Basel Convention has also proposed unlimited

²⁹ See Chapter 5, Section 6, and Chapter 6, Section 3.

³⁰ See Chapter 2, Section 5.2.

liability. However, potential liable persons will be required to obtain limited insurance which will be reviewed regularly. It will be interesting to see whether unlimited liability will be finally adopted and the minimum amount of insurance required.³¹

Imposing liability on generators for transport and disposal accidents is supported by both domestic and regional legislation as a method of internalization of waste production costs by generators. Disposers must also be held liable for disposal accidents. Disposers must have the facilities and equipment to verify the quantities and categories of wastes they receive in order to ensure that they are suitable for the services they provide. Disposers should also be held liable for transportation accidents if they could control the transporter or influence her selection.

Imposing liability on transporters is not a common practice. The nuclear liability Conventions avoid placing liability on transporters of nuclear materials – including wastes. The draft European Community Directive also specifies that waste transporters will be held liable only for a limited amount, and will be absolved from liability if they can identify the waste producer. Only the CRDT Convention holds carriers exclusively liable, but only for a limited amount. Exonerating transporters from liability, however, has yet to be adequately explained. Waste transporters must examine and verify the identity and package of wastes. They should refuse delivery if the wastes are improperly identified in the consignment note, or if the packaging seems faulty. It is important to establish such a responsibility; otherwise, transporters would have an incentive to engage in high-risk transfers. At the same time, waste transporters should be provided with defenses, if they can identify the generator and demonstrate that further examination of the waste was infeasible or that the generator failed to disclose the nature of the wastes. But the transporter's negligence should not be used as a defense. Other defenses for waste transporters may also be appropriate because generators will often force transporters to expedite waste shipments, and because there is significant room for fraud when wastes are already packaged and ready for transportation.

In addition, as mentioned above, generators, transporters and disposers must not be held liable when they have complied with the minimum and other standards, or when the damage is the result of *force majeure*, or intentional acts, or omissions of a third party or the victim. Claims that wastes had to be disposed of in the sea or at the roadside because of *force majeure* should be thoroughly investigated, given that waste transporters will always be tempted to dispose of the wastes as inexpensively as possible.

³¹ See Draft Articles of a Protocol on Liability and Compensation for Damage Resulting from the Transboundary Movement of Hazardous Wastes and their Disposal, Art. 5, UNEP Doc./CHW.1/5 (1992) [hereinafter UNEP-liability].

Liability must be joint and several when more than one person is liable and the damage is not separable.³² All actors involved in waste management must have the right of recourse or subrogation against one another. Such a right will be particularly useful when waste disposal facilities are situated in developing countries and are operated by small or state-owned companies, and the deep-pocket generators are located in a developed country. In general, joint and several liability would provide incentives for generators to select responsible transporters, for transporters to verify the types of wastes they transport, and for disposers to double-check the wastes they receive.

Liability should cover personal injuries, property, other economic damages, costs of preventing environmental harm and cleaning-up the environment. Preventive and clean-up costs may be subject to a cost-benefit analysis after examining the circumstances of each case. Compulsory insurance must also be imposed, but it should include both alternative and traditional types of insurance. Moreover, given the particular nature of waste management, the statute of limitations should be extended to twenty or thirty years after knowledge of the occurrence of pollution.³³ The geographical scope of an international liability regime must include the territory, the territorial sea, and the exclusive economic zone.

Securing such provisions in an international convention should not be difficult since most national and international tort law contains similar provisions for environmental accidents. It will be difficult, however, to establish an international standard of proof because national legislation in that area is still evolving. This standard, because of the long latency periods between exposure and disease, should allow for reliable epidemiological studies to be considered. Because of the underdeterrence of the chemical industry,³⁴ it should be flexible enough to allow courts to consider the particularities of individual cases. Claims for emotional distress or for fear of cancer must also be given careful consideration. Plaintiffs must be able to choose between the forum where the damage occurred, the forum where the environmental accident originated, or the place of business of the generators, transporters and disposers. Existing conventions limiting the fora to the place where the incident or damage occurred only encourage defections from established liability regimes when accidents actually happen and the forum designated does not serve the plaintiffs' interests.

It will also be difficult to include in a single international instrument issues already covered by other international instruments or under the jurisdiction of different international organizations. As emphasized, there are international

³² Joint and several liability was adopted by the Council of Europe in the draft Convention on liability from activities dangerous to the environment. *See* Art. 6(2)-(3), Draft Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, July 31, 1992, DIR/JUR (92) 3. Under article 7(1), after closure of a disposal site the last operator shall be liable and can have recourse against any third party.

³³ UNEP-liability, *supra* note 31, Art. 6(2).

³⁴ *See* Chapter 5, Section 6.2.

conventions dealing with the transportation of toxic and radioactive wastes along with the transportation of dangerous and nuclear materials. There is also a fragmentation of international institutions responsible for hazardous and radioactive wastes. In the case of maritime transport, waste shippers may resist the imposition of liability by invoking the traditional rules of maritime law which place liability on shipowners. For these reasons, it will be useful if the protocol to the Basel Convention is drafted with the active cooperation of IMO, IAEA, and OECD.³⁵ Such cooperation would elucidate many issues.

2.2. *Liability as a Catharsis and Instrument of Democratic Controls*

Another advantage of liability, and especially unlimited liability, is that it has cathartic effects on accident victims and imbues the international system with direct democratic controls.

In domestic arenas, suing polluters not only potentially prevents accidents and provides effective compensation; it also empowers the *individual*³⁶ to force industry to change practices, and to send a signal to governments that legislative action is imperative.³⁷ Certainly, interest groups, in a democracy, can always lobby and participate in public hearings. The advantage that the tort system offers, as opposed to a social security system, is that each individual citizen can initiate action and voice concerns in an adversarial setting. In many cases, only by personally initiating action before an impartial judge can accident victims be persuaded that justice is serviced. The catharsis of a public trial is especially important in cases of catastrophic accidents when victims demand some sort of vindication.³⁸ Thus the tort system performs a dual function. It acts as a tension release mechanism of social passions. It also introduces elements of direct democracy in corporate boardrooms and government bodies where the decisions affecting people are made. In other words, the tort system instills democratic controls in a society where democracy is limited to periodic elections,³⁹ and in this respect, it is undoubtedly superior to any social insurance system.

The international community, despite patterns of cooperation, is still deeply divided between the privileged and underprivileged, and this division is often the cause of adversariness and conflict. A private liability system can assuage confrontations by empowering the citizens of developing coun-

³⁵ It seems that such cooperation already exists. See 67th Session Report, *supra* note 330, at 25, Chapter 2.

³⁶ See also P.S. Atiyah, *Accidents, Compensation and the Law* 554 (1980) [hereinafter *Accidents*].

³⁷ See also Huber and Litan, *supra* note 449, Chapter 5 (liability may play a role in "helping regulators identify potentially unsafe products and encouraging them to take action.").

³⁸ See, e.g., *Accidents*, *supra* note 36, at 553 (the author emphasizes that the tort system is instrumental in appeasing social divisions after catastrophic accidents as, for example, in the case of an accident involving the collapse of coal tip onto a school, which caused the deaths of 116 children and 28 adults).

³⁹ See also J.K. Lieberman, *The Litigious Society* (1981).

tries to sue multinational corporations in national courts. This is especially pertinent when social dichotomies are inflamed by catastrophic accidents of international dimensions, such as the Bhopal incident, which entail not only economic and property damages, but also physical injuries and deaths. In such cases, the public often considers a settlement between the state and the corporate entity unsatisfactory.⁴⁰ Only the entitlement to compensation through settlement under the threat of litigation, or through adjudication, can convince people that justice is done, and can relieve the helplessness that victims experience when confronted with the unexpected consequences of environmental accidents. The notion that private liability can work as a tension release catalyst in international fora stems human rights litigation. After *Filartiga v. Pena-Irala*,⁴¹ for example, citizens of developing countries have started bringing suits against human rights violators in the courts of the United States. The purpose of these suits is vindication rather than compensation.⁴²

Citizen participation in international arenas achieves also something more fundamental. In pursuit of justice in transnational fora, citizens essentially join in the formation and strengthening of international rules by establishing precedents on unacceptable corporate or state behavior. The importance of citizen participation is that it is not effectuated through state representation, but through direct individual involvement in affairs of international dimensions. In this fashion, international law is infused by elements of direct democracy, and transformed from an instrument at the disposal of governments to an instrument in the hands of those really affected by it.

Viewing international torts as capable of dynamically introducing direct democracy in the international system could be criticized as unrealistic, since

⁴⁰ See Lepkowski, *Union Carbide-Bhopal Saga Continues as Criminal Proceedings Begin in India*, Chemical & Engineering News, May 16, 1992, at 7 (the \$470 million settlement between India and Union Carbide mediated in 1989 by the Indian Supreme Court encompassed both civil and criminal charges. "But public outcry was so strong that the court agreed to review its decision. It completed its review last December, upholding the settlement but restoring the criminal charges it had thrown out as part of the 1989 ruling.").

⁴¹ 630 F. 2d 876 (2nd Cir. 1980) (the case involved a suit of two Paraguayan citizens (father and daughter) against Pena, another Paraguayan citizen and former Inspector General of the Police in Paraguay. According to the plaintiffs, Pena had tortured to death their son and brother. The court concluded that it had subject matter jurisdiction based on the Alien Tort Statute, 28 U.S.C. §1350, which provides: "The district courts shall have original jurisdiction of any civil action by an alien for tort only, committed in violation of the law of nations or a treaty of the United States.").

⁴² See Rohter, *Ex-Ruler of Haiti Faces Human Rights Suit in the US*, N.Y. Times, Nov. 15, 1991, at B10, col. 3 (the objectives of these lawsuits are political and psychological. As a lawyer for six Haitians formulated it: "There is a message here to other military thugs and human rights violators, which is that you're not going to get away with it."). Relying on the Alien Tort Claims Act human rights groups have filed claims against the Serbian leader in Bosnia, Radovan Karadžić, on behalf of women raped during the civil war in the former Republic of Yugoslavia. Because of the lawsuit, Karadžić asked the United States administration to grant him immunity in order to participate in the peace talks held at the United Nations headquarters in New York. See Lewis, *Immunity Sought for Bosnian Serb: Atrocities Suit in a US Court Cited as Barrier to Talks*, N.Y. Times, Feb. 23, 1993, at A8, col. 1.

citizens in most countries are not litigious. This reality, however, is changing at a rapid pace. Environmental groups in developing countries have started bringing suits against corporate and government polluters. In Korea, for example, the contamination of groundwater supplies led to criminal charges against top corporate officials.⁴³ In Malaysia, an environmental group brought an action against a corporation for the alleged harm to pregnant women and children caused by radioactive waste dumping.⁴⁴ There also have been suits on behalf of future generations and for failing to comply with environmental impact assessments.⁴⁵

The growth of national litigation renders an international tort system for environmental harms extremely relevant. Building such a system would not necessarily be a panacea for all the procedural hurdles of private international law.⁴⁶ It could, however, lay the foundation for a more coherent action when the circumstances arise. These circumstances are very likely to develop, given the inadequacies of the existing international system in controlling hazardous and radioactive waste transfers.

2.3. *The Inadequacy of Liability as a Compensation Mechanism*

The difficulties of proving exposure and the linkage between exposure and disease diminish liability's ability to adequately compensate pollution victims, and makes necessary a compensation fund. The fund could be modeled after the 1971 and 1984 oil pollution Funds and provide for residual or full compensation and immediate relief. Partial compensation will be necessary in the event businesses are unable to shoulder the full amount of compen-

⁴³ Corash and Falk, *Through a Cleaner Looking Glass*, Legal Times, May 11, 1992, at 16 (Lexis, Nexis, Omni File).

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ See Jessurum d'Oliveira, *The Sandoz Blaze: The Damage and the Public and Private Liabilities*, in *Environmental Harm*, *supra* note 240, at 429, 442, Chapter 2. These procedural hurdles stem from the fact that different countries adopt different conflict of law rules. For example, in the Sandoz disaster many problems emerged because the countries involved – France, Germany, Netherlands and Switzerland – have different rules of private international law. In addition, corporate subsidiaries without many assets are often involved in severe accidents. In these cases, plaintiffs have tried to pierce the corporate veil and sue the parent company in the courts of the state where it is located. Bhopal is a typical case on point. The success of these lawsuits has been mixed and the law on this subject needs further clarification. See Scovazzi, *supra* note 240, at 395–96, Chapter 2.

In response to the above concerns, certain countries have signed agreements that provide equal access to national remedies. The principle of equal access agreements is that plaintiffs suffering damages in a country other than the country where the environmental accident originated enjoy in the country where the accident originated the same legal treatment as the citizens of that country. However, these agreements are rare and do not solve the problem that the laws of the country of origin of environmental accident may be inadequate to deal with such accidents. See Boyle, *Making the Polluter Pay? Alternatives to State Responsibility in Allocation of Transboundary Environmental Costs*, in *Environmental Harm*, *supra* note 240, at 363, 370–73, Chapter 2.

sation. Full compensation will be warranted when industries are not liable, do not exist anymore, or when national courts reject compensation claims because of no apparent causal relationship between exposure and disease. In the latter case, plaintiffs may be allowed to file claims against the fund at least twice after the initial claim, if they can demonstrate with stronger evidence the relationship between exposure and disease. The fund could also provide immediate assistance during catastrophic accidents and sponsor international disaster relief efforts in the high seas.

The fund could be financed by waste exporting and importing states in proportion to their wealth and the volumes of wastes they import or export.⁴⁷ States can, in turn, tax waste generators, transporters, or disposers. Direct industry financing under state supervision should not be excluded, but as demonstrated, it will be difficult to establish because industries generating wastes, unlike industries involved in the oil business, are very diverse. An alternative approach would be to institute a preliminary fund involving mandatory state contributions and voluntary industry contributions. After an initial period, the performance of the fund will be evaluated, and states will be required to submit proposals concerning industry's direct contributions to the fund. For this purpose, during the initial stage, states will have to accumulate and analyze information on waste production, waste exports, and accidents due to waste mismanagement for each industrial sector. The advantage of the two-stage approach is that it would entice industry to contribute to the fund under the threat that, if voluntary contributions are inadequate, they will become mandatory. As evidenced by CRISTAL and TOVALOP, industry is more willing to contribute to voluntary schemes than to mandatory ones. The fund could be administered temporarily by an existing international organization, for example, UNEP, IAEA, the World Bank, the GEF or preferably by an international agency specializing in waste management.⁴⁸

⁴⁷ Transnational Management, *supra* note 24.

⁴⁸ *Id.* at 22-23.

Conclusion

The incoherence of waste management standards in major exporting countries, lack of standards in the developing world and proliferation of disposal costs are indicators that legal and illegal waste shipments will continue unabated. The existing international instruments are unable to regulate or curtail such movements because they discount the *static* dimension of wastes. The *static* dimension dictates that reliance on burdensome requirements and confusion about the premises of waste transfers will encourage illegal waste trafficking. The prohibitory and restrictive language of existing instruments ignores also the *dynamic* dimension of wastes, and undermines a conception of them as valuable materials that can be reused in the production process.

The proposed system has more chances to succeed because it is structured on the *static* and *dynamic* dimensions of wastes, the limitations of monitoring and enforcement mechanisms, and the scarcity of resources. One of the goals of the proposed system is to induce industry's compliance by developing an atmosphere of certainty about waste management standards. Another goal is to encourage transnational business activities that propagate the *dynamic* dimension of wastes. These goals are achieved by two methods: initiation of minimum and other waste management standards and stimulation of international waste trade and exchanges.

Both the proposed methods and goals are not irreconcilable with the existing international regulatory regime. They are incompatible, however, with an interpretation of the regime that highlights the principles of proximity and self-sufficiency over effectiveness and efficiency. A narrow interpretation of the proximity and self-sufficiency principles will imperil the development of scale economies, the growth of the waste management industry, and present and future monitoring and enforcement.

The United States experience is a good illustration of the thesis of this study that multiplication of cumbersome requirements does not necessarily induce waste reduction or sound waste management. This experience has not only been instructive for the prescription of the proposed international regime, but also for the interpretation of the European policy which is similarly

based on the proximity and self-sufficiency principles. On the other hand, the Community experience with local integrated facilities, sustains the argument that comprehensive facilities, in order to be profitable, need to be transnational and open to global waste markets.

By exploring and expanding on the above considerations the purpose of this study is to demythologize the waste issue and elucidate the often elusive element of waste transfers: that wastes are not inherently immoral, and that considering them as such, by imposing barriers on their movements, will damage sound waste management.

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